EDISON ELECTRIC INSTITUTE BULLETIN

FEBRUARY, 1936

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EDISON ELECTRIC INSTITUTE

STATISTICAL DATA OF THE ELECTRIC LIGHT AND POWER INDUSTRY

Compiled Monthly by the Edison Electric Institute—Covers 100% of the Industry

DURING THE MONTH OF DECEMBER (Preliminary)

	1935	1934	%
Kilowatt-hours Generated* (net)			
By Fuel	5,506,534,000	4,552,614,000	+21.0
By Water Power	2,951,917,000	2,929,460,000	+ 0.8
Total Kilowatt-hours Generated	8,458,451,000	7,482,074,000	+13.0
Additions to Supply			
Energy Purchased from Other Sources	165,585,000	156,772,000	+ 5.6
Net International Imports	63,344,000	76,433,000	−17.1
Total	228,929,000	233,205,000	− 1.8
Deductions from Supply			
Energy used in Electric Railway Departments	57,126,000	61,168,000	− 6.6
Energy used in Electric and Other Departments	109,053,000	115,774,000	− 5.8
Total	166,179,000	176,942,000	− 6.1
Total Energy for Distribution	**8,521,201,000**	**7,538,337,000**	**+13.0**
Energy Lost in Transmission, Distribution, etc.	**1,492,315,000**	**1,412,230,000**	**+ 5.7**
Kilowatt-hours Sold to Ultimate Consumers	**7,028,886,000**	**6,126,107,000**	**+14.7**
Sales to Ultimate Consumers (kw-hrs)			
Domestic Service	1,368,378,000	1,223,762,000	+11.8
Commercial—Small Light and Power (Retail)	1,360,501,000	1,192,323,000	+14.1
Commercial—Large Light and Power (Wholesale)	3,492,857,000	2,969,462,000	+17.6
Municipal Street Lighting	227,313,000	205,916,000	+10.4
Railroads—Street and Interurban	438,693,000	417,796,000	+ 5.0
Railroads—Electrified Steam	85,554,000	64,347,000	+33.0
Municipal and Miscellaneous	55,590,000	52,501,000	+ 5.9
Total Sales to Ultimate Consumers	7,028,886,000	6,126,107,000	+14.7
Total Revenue from Ultimate Consumers	$173,458,700	$163,806,700	+ 5.9

DURING TWELVE MONTHS ENDING DECEMBER 31st

Kilowatt-hours Generated* (net)			
By Fuel	55,951,317,000	53,808,235,000	+ 4.0
By Water Power	36,377,037,000	31,122,647,000	+16.9
Total Kilowatt-hours Generated	92,328,354,000	84,930,882,000	+ 8.1
Purchased Energy (net)	3,022,266,000	2,646,374,000	+14.2
Energy Used in Electric Railway and Other Departments	1,930,354,000	2,013,132,000	− 4.1
Total Energy for Distribution	**93,420,266,000**	**85,564,124,000**	**+ 9.2**
Energy Lost in Transmission, Distribution, etc.	**15,865,518,000**	**14,782,344,000**	**+ 7.3**
Kilowatt-hours Sold to Ultimate Consumers	**77,554,748,000**	**70,781,780,000**	**+ 9.6**
Total Revenue from Ultimate Consumers	**$1,921,076,800**	**$1,837,046,000**	**+ 4.6**
Important Factors			
Percent of Energy Generated by Waterpower	39.4%	37.0%	
Average Pounds of Coal per Kilowatt-hour	1.44#	1.45#	
Domestic Service (Residential Use)			
Average Annual Consumption per Customer (kw-hr)	673	631	+ 6.7
Average Revenue per kw-hr (Cents)	5.03¢	5.30¢	− 5.1
Average Monthly Bill per Domestic Customer	$2.82	$2.79	+ 1.1

BASIC INFORMATION AS OF DECEMBER 31st

Generating Capacity (kw)—Steam	23,988,900	23,708,900	
—Waterpower	8,958,000	9,021,700	
—Internal Combustion	499,500	468,500	
Total Generating Capacity in Kilowatts	33,446,400	33,199,100	
Number of Customers**			
Farms in Eastern Area (Included with Domestic)	(573,000)	(534,203)	
Farms in Western Area (Included with Commercial—Large)	(217,000)	(209,751)	
Domestic Service	21,071,729	20,484,232	
Commercial—Small Light and Power	3,723,539	3,727,478	
Commercial—Large Light and Power	511,435	526,853	
Other Ultimate Consumers	64,263	69,974	
Total Ultimate Consumers	25,370,966	24,808,537	

* By courtesy of the U. S. Geological Survey with deductions for certain plants not considered electric light and power enterprises.
** Subject to revision on completion of state by state tabulation.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume IV FEBRUARY, 1936 No. 2

Interpretation of "Power Output" Figures

Present Increase Over 1929 Does Not Imply Similar Earnings for Utilities, Nor Does It Indicate a Comparable Improvement in General Business Conditions — Factor of Growth Must Be Considered — "Power Shortage" Still in the Future

By William M. Carpenter
Economist, Edison Electric Institute

IN 1928, the National Electric Light Association began to report to the public the weekly output of electricity by the light and power enterprises of the United States. Resting upon what is still (if properly interpreted) a very real relation to general business activity, the use of uncorrected figures of power output as an all-embracing indicator of depression and recovery has long-since captured the popular imagination. Many "indexes of business activity" rest heavily upon power production and the public has come to look upon its recent increase as an infallible sign of the prosperity not only of the country as a whole but, still more, of the utilities themselves.

Although the production of manufactures and mines, as reported by the Federal Reserve Board, is still some 20 per cent below the 1929 average, power output is now 10 per cent above the same level. Every week last fall, new high records were made in the production of electricity, yet the light and power industry barely returned 5¼ per cent on its investment for the year 1935. Such contradictions indicate that it is high time to examine the figures and to point out the important qualifications which attach to their use and which are essential for their correct interpretation.

Increased Output Does Not Necessarily Mean Increased Earnings

The first popular fallacy is that improvement in output is paralleled by a similar improvement in earnings. This is reflected not only in current stock-market gossip but also in the thought and speech of many public men who have emphasized the gains in power production and the present position of some widely used indexes of output as proving that the public utilities are once again in a very prosperous condition and could bear without undue hardship the additional burdens of regulation and further taxation. If this were really so, then the utilities would indeed be in an enviable position, but actually rate reductions have considerably offset increased uses, while heavier taxes have further cut into such gains as remain. Indeed, the position of the stockholder has only been improved largely through the refunding of bonds on an unprecedented scale, a procedure which passes the effects of the depression along to the colleges, hospitals and other endowed institutions of the country.[1]

The lack of relationship between output and revenues is emphasized by Table I, which shows the annual totals and their position relative to 1929, and by Fig. 1, which gives the trend of output and revenues, month by month since 1928. These latter figures represent the values per average day, expressed in each case as a percentage of the average for the year 1929.[2] Even a most casual inspection discloses the absence of harmony between the two curves.

During the early years of the depression, the stabilizing effect of the sales of business lighting and domestic service tended to keep revenues from declining as rapidly as did output, while during the present stage of the recovery the conditions have been reversed. At the present time, largely because of the unprecedently low unit price at which large, industrial, electricity is being sold, the upward trend of revenues has slowed down perceptibly, while output is still expanding. While some improvement may be expected, it is evident that revenues will continue for some time to fall short of their pre-depression relationship to output.

Increased Output Over 1929 Does Not Necessarily Imply a Comparable Business Recovery

A second popular fallacy is that, because power output is now considerably above 1929, complete industrial recovery is at hand. This conclusion arises largely as the result of ignoring the substantial increase in the connected load of the light and power systems that has actually taken place during the past seven years and, as this produces index numbers that are materially too high, it

[1] See "No Benefit to Investors or Workers from New High Records in Power Output," The Annalist, October 18, 1925, and also January 17, 1936.

[2] "Power Output" is the figure reported by the Institute as the "total electricity for distribution to consumers" each month and corresponds to "weekly power output" each week. This figure has been divided by the actual number of calendar days in each month.

"Revenues" represent the total billings against all consumers, divided by the probable number of days in each billing period. As pointed out by Mr. Knaf in his article, where sales are computed from meter readings, part are in one month and part in the one before and the figure for the "average day" is necessarily somewhat approximate. Note that the revenues follow a smoother curve than the output and the obvious seasonal effects of the lighting load.

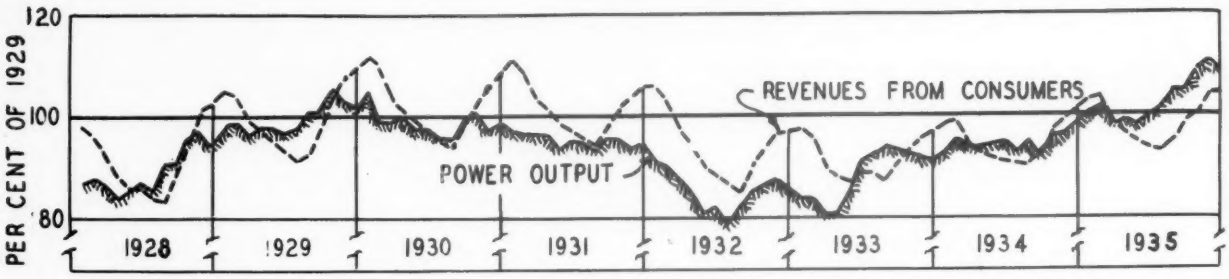


Fig. 1—Indexes of Electric Power Production Are Not Indexes of Public Utility Earnings

The solid line shows output, the dotted line revenues, both expressed as percentages of the 1929 average. At some periods, revenues have increased faster than output, at other times more slowly. Just now the revenues are lagging far behind production. The seasonal effect of the lighting load upon revenues is very plain.

leads to a considerable overstatement of actual conditions.

This is not meant to decry the close relationship between industrial production and *sales of industrial power,* which might appear to be self-evident, but merely to point out that there are inherent errors involved in the use of figures covering *total output for all purposes* and that the factor of long-term growth has at last become so important that it can no longer be ignored.

TABLE I—GROWTH OF OUTPUT AND REVENUES

Year	Output (Million Kwhr)	% of 1929	Revenues (Million $)	% of 1929
1928	80,830	89.5	1,784.3	92.0
1929	90,277	100.0	1,938.5	100.0
1930	89,467	99.1	1,991.0	102.7
1931	86,064	95.3	1,975.9	101.9
1932	77,442	85.8	1,832.6	94.5
1933	80,010	88.6	1,773.4	91.5
1934	85,564	94.8	1,837.0	94.8
1935	93,420	103.5	1,921.0	99.1

Fig. 2 gives the relationship between industrial production, sales of industrial power, and the total output of electricity, the definitions of the various items being indicated by the footnotes to the chart. The close parallel between the adjusted sales of large light and power and the Federal Reserve Board's index of production since 1931 is evident. Except for the period of the sharp peak in the summer of 1933, when a number of industries violently increased their out-

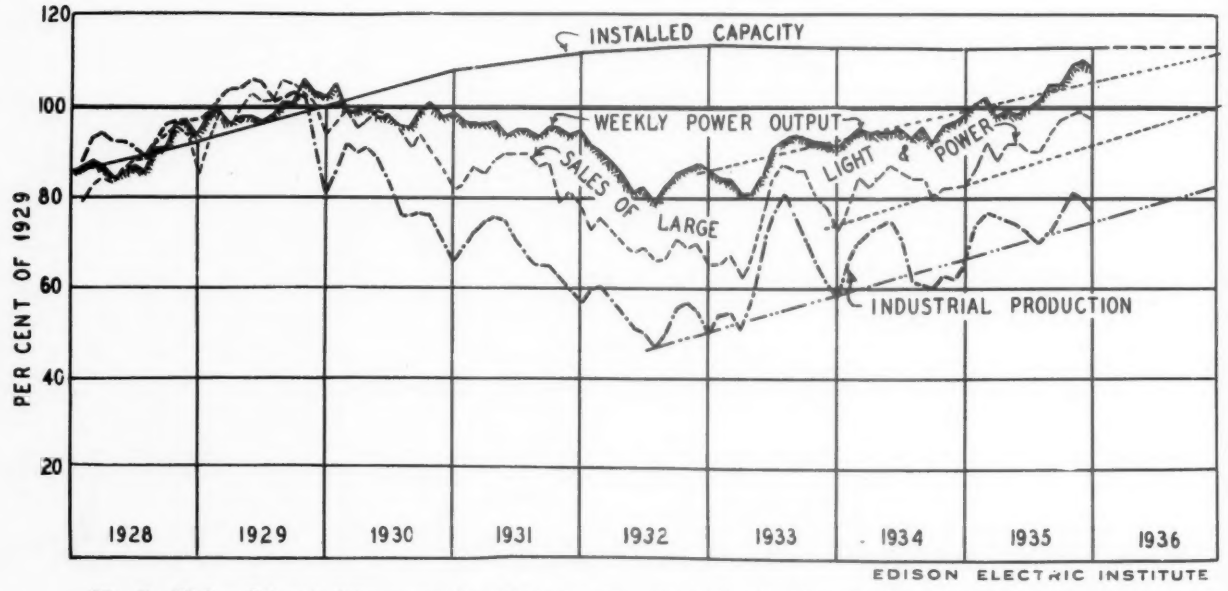


Fig. 2—Unless Liberal Allowances Are Made for Growth, "Electric Power Indexes" Are Much Too High

As indicated by the growing divergence between the sales of large power and industrial production, the electrification of industry did not stop in 1929 but continued for several years as the result of President Hoover's construction program. In addition to this, the use of domestic appliances has continued to grow rapidly. Judging from the Federal Reserve Board's index of industrial production, there has been an increase of some 30 per cent in the electric industry's total connected load since 1929.

NOTE: *"Industrial Production"* is the unadjusted index of mining and manufactures of the Federal Reserve Board, expressed as percentages of the average month of 1929.

"Weekly Power Output" is the daily average of the "total electricity for distribution to consumers" (which, as reported each week by the Institute, is commonly known as "power output"), expressed as percentages of the average day of 1929.

"Sales of Large Light and Power" are the average daily sales of electricity in this classification, *excluding irrigation,* expressed as percentages of the average day of 1929. Due to the fact that these sales are reported by billing periods which are not exactly coincident with the calendar months, some liberties have been taken with the number of days in the individual months.

"Installed Capacity" represents the kw of effective generating machinery in the power houses of the electric light and power industry (excluding traction and industrial enterprises) on December 31 of each year, expressed as percentages of the total on December 31, 1929.

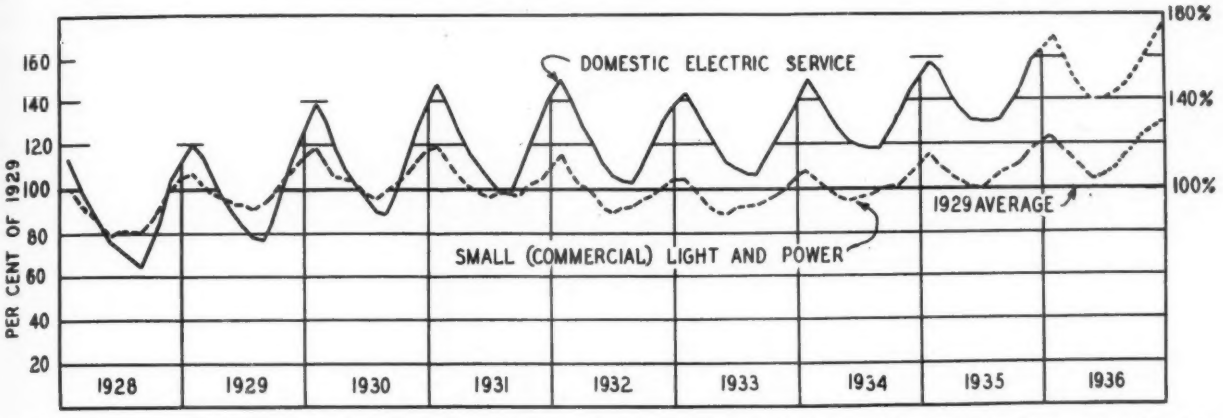


Fig. 3—One Reason Why Power Output Indexes Tend to Overstate Business Activity—The Growth of Domestic Electricity

Residential electric service is now running at the rate of 60 per cent above 1929 figures. Small commercial service, on the other hand, has been very disappointing. The curves are those of the daily average for each billing month, expressed as percentages of the average day of 1929.

put in anticipation of the impending NRA, the two curves have been apart by an almost constant amount.[3]

A detailed examination of these curves is of some interest to the utility industry because their spread would seem to furnish some indication of the growth of the connected load. It becomes very evident that the electrification of industry did not stop with 1929. Not only were existing plans carried out, but new ones were put into effect as the result of the construction program adopted by industrial executives at the instance of President Hoover. Utility executives did the same thing and built a corresponding increase in generating capacity. Power sales and industrial production ran parallel in 1928 and 1929. Although manufactures fell off in 1930, the change from self-produced to purchased power continued throughout the year until the completion of the expansion programs in 1931, with the result that the curve of electric power sales fell less rapidly. Since 1931, the parallelism of the two lines would seem to indicate little net change in the extent of electrification and at the present time the spread is of the order of 20 per cent, which may roughly be assumed to indicate the extent of the increase of load in factories, mills and mines since 1929. To this must of course be added the very conspicuous growth in domestic service, which now approximates 60 per cent during the past seven years and which is shown graphically by Fig. 3.

[3] A large part of this outburst occurred in the textile industry, which has a considerable reserve capacity of its own. It is quite possible that a substantial portion of the increased activity was reflected in the use of this reserve power from the plants of the industry itself, rather than in power purchased from the utilities.

TABLE II—CAPACITY AND MAXIMUM OUTPUT

Year	Capacity, Kw	% of 1929	Peak Week, Kwhr	% of 1929
1927	25,278,000	85.5	.....	...
1928	27,221,000	92.1	1,716,000,000	92.3
1929	29,559,000	100.0	1,860,021,000	100.0
1930	32,050,000	108.4	1,769,994,000	95.1
1931	33,077,000	111.9	1,675,653,000	90.0
1932	33,593,000	113.6	1,563,384,000	84.0
1933	33,494,000	113.3	1,656,616,000	89.1
1934	33,242,000	112.5	1,787,936,000	96.1
1935	33,446,000	113.1	2,002,005,000	107.6

The sum of all factors is indicated by the hatched line of total output, which is now about 10 per cent above 1929. Its irregularity and its lack of relationship to industrial production is apparent, again emphasizing the effects of daylight, weather, irrigation, and what the economists love to call "random events."

A Guess as to the Future

The worst of the depression took place in the summer of 1932 and since then there has been a steady recovery. It may be just a coincidence, or it may be a sign of deep-seated forces, that the line joining December, 1932, 1933, and 1934 is a straight line. It is safe to say that, if the seasonal changes had not been upset by the departure of the automotive industry from its traditional date in advancing the time of the introduction of new models, December, 1935, would also have come on the same line. If this series of remarkable coincidences has held good for so long, it may reasonably be assumed that December, 1936, will again fall on the prolongation of the same line, and the rest of the curves may be projected accordingly, although no amount of clairvoyance will construct the curve of industrial production during the intervening months.

The "Power Shortage" Still in the Future

The "power shortage," which had been freely prophesied early in 1935, failed to materialize during the critical month of December. As shown in Table II, while generating capacity was 13 per cent above 1929, power output during the peak week showed an increase of only 7.6 per cent above the same week in 1929. On the basis of the heaviest week of December, 1929, the total which could be produced from present equipment is about 2,100,000,000 kwhr per week, or 5 per cent more than was required in 1935. These figures, of course, are over-all totals for the country as a whole. Individual locations would probably show wide differences, ranging from a close approach to 1929 loadings in some places to a large excess in others. At the same time, they do not take into account the very obvious *improvement in load factor* on which all within the industry have repeatedly commented and which acts to further increase the margin of excess capacity by a considerable, although still unevaluated, amount.

The prolongation of the top line of total power output to December, 1936, gives the same relation to installed capacity that existed in December, 1929. This would imply that the possibility of a "power shortage" this coming fall is again remote for the country as a whole, but, at the same time, it calls attention to the fact that, if business improvement continues at the same average rate, some increase in generating capacity at certain points will become necessary this fall and a considerable amount of new construction will be required for 1937.

DATA FOR YEAR 1935

STATISTICAL DATA OF THE ELECTRIC LIGHT AND POWER INDUSTRY

Compiled by the Edison Electric Institute—Covers 100% of the Industry

1935 ANNUAL DATA

	1935	1934	%
Kilowatt-hours Generated* (net)			
By Fuel	55,951,317,000	53,808,235,000	+ 4.0
By Water Power	36,377,037,000	31,122,647,000	+16.9
Total Kilowatt-hours Generated	92,328,354,000	84,930,882,000	+ 8.7
Additions to Supply			
Energy Purchased from Other Sources	2,138,840,000	1,752,374,000	+22.1
Net International Imports	883,426,000	894,000,000	− 1.2
Total	3,022,266,000	2,646,374,000	+14.2
Deductions from Supply			
Energy Used in Electric Railway Departments	579,510,000	652,523,000	−11.2
Energy Used in Electric and Other Departments	1,350,844,000	1,360,609,000	− 0.7
Total	1,930,354,000	2,013,132,000	− 4.1
Total Energy for Distribution	**93,420,266,000**	**85,564,124,000**	**+ 9.2**
Energy Lost in Transmission, Distribution, etc.	**15,865,518,000**	**14,782,344,000**	**+ 7.3**
Kilowatt-hours Sold to Ultimate Consumers	**77,554,748,000**	**70,781,780,000**	**+ 9.6**
Number of Customers (Average for Year)			
Domestic	20,779,101	20,265,890	+ 2.5
Commercial—Small Light and Power (Retail)	3,759,367	3,705,712	+ 1.4
Commercial—Large Light and Power (Wholesale)	504,046	526,550	− 4.3
Municipal Street Lighting	38,624	38,377	−
Street and Interurban Railways	645	637	−
Electrified Steam Railroads	27	27	−
Municipal and Miscellaneous	30,216	28,752	−
Total Number of Ultimate Consumers	25,112,026	24,565,945	+ 2.2
Kw-hrs Sold to Ultimate Consumers			
Domestic Service	13,978,038,000	12,797,635,000	+ 9.2
Commercial—Small Light and Power (Retail)	14,221,868,000	13,150,738,000	+ 8.1
Commercial—Large Light and Power (Wholesale)	41,162,318,000	36,918,569,000	+11.5
Municipal Street Lighting	2,340,108,000	2,203,484,000	+ 6.2
Street and Interurban Railways	4,413,683,000	4,352,119,000	+ 1.4
Electrified Steam Railroads	834,863,000	702,664,000	+18.8
Municipal and Miscellaneous	603,870,000	656,571,000	− 8.0
Total to Ultimate Consumers	77,554,748,000	70,781,780,000	+ 9.6
Revenue from Ultimate Consumers			
Domestic Service	$702,682,600	$677,697,300	+ 3.7
Commercial—Small Light and Power (Retail)	538,393,800	511,681,700	+ 5.2
Commercial—Large Light and Power (Wholesale)	528,948,100	495,657,100	+ 6.7
Municipal Street Lighting	91,821,900	92,984,400	− 1.3
Street and Interurban Railways	38,725,400	37,838,400	+ 2.3
Electrified Steam Railroads	7,766,500	6,725,800	+15.5
Municipal and Miscellaneous	12,738,500	14,461,300	−11.9
Total from Ultimate Consumers	$1,921,076,800	$1,837,046,000	+ 4.6
*Number of Customers on December 31st were as follows:			
Farms in Eastern Area (Included with Domestic)	(573,000)	(534,203)	
Farms in Western Area (Included with Commercial—Large)	(217,000)	(209,751)	
Domestic Service	21,071,729	20,484,232	
Commercial—Small Light and Power	3,723,539	3,727,478	
Commercial—Large Light and Power	511,435	526,853	
All Other Ultimate Consumers	64,263	69,974	
Total Ultimate Consumers	25,370,966	24,808,537	

* By courtesy of the U. S. Geological Survey with deductions for certain plants not considered Electric Light and Power Enterprises.

Advertising as an Aid to Salesmen

By Paul Renshaw

Advertising Manager, Memphis Power & Light Co.

ADVERTISING has been variously defined. It has been termed Printed Salesmanship . . . the Voice of Business . . . the Dynamo of Trade . . . a Main Spring in the Machinery of Commerce and Industry. It is an aid to sales, a vehicle for business expression, a stimulant to distribution. However you view it, it is a very definite business force. I like to think of it as the Tool of Business:

With this conception, the Advertising Department may be compared to a Tool Kit, with equipment for performing a variety of services.

* * *

In brief outline, the advertising of our industry can be classified into three general types.

1—Institutional Advertising . . . strictly informative, designed to acquaint readers with issues of the moment, or to interpret company policies as they relate to public welfare.

2—Service Advertising . . . designed to interpret phases of the company's operations as these affect customers, or may be of public interest and concern. This type is quasi-institutional and quasi-business-development.

3—Merchandise Advertising . . . designed to create or increase sales volume, and add "load" to our lines or mains. This is purely commercial.

The advertising story grows out of an intimate knowledge of these: . . . the policies the institution pursues . . . the service it renders . . . the merchandise it offers to its customers. Its essence and its strength come from them. Like the limbs and branches of a tree, it draws its vitality from the roots of this knowledge. Also, as the limbs, branches and leaves give symmetry to the tree, so well-told advertising gives a rounded picture of an institution . . . its policies . . . its services . . . its merchandise. Advertising is like a label . . . it marks the type of an institution. If you know the kind of advertising a store does, you can judge the store.

Each general type of advertising is susceptible of a variety of treatment. In fact, a multitude of ideas are inherent in each—and spring from them under genius and resourcefulness in advertising. Indeed, it may be said that the genius and resourcefulness—or lack of it—in those responsible for the advertising, is the only limit to advertising treatment.

MR. RENSHAW

A thought may be expressed, and the same object advertised, in a variety of ways. Let me illustrate:

—I may say to you: "Look at yonder bow-legged man." I have expressed a simple thought in a simple way to call attention to an ordinary object.

—Or on the same subject, in the slang of the street, I might say: "Lamp the guy with the crooked stems"—Just another but entirely different way of pointing out the same individual.

—Again, adopting something of the classic style, perhaps as Shakespeare might say it, I could exclaim:

"Behold! What manner of man is this,
Whose legs appear like a parenthesis."

That illustrates potential variety of expression. It likewise suggests potential variety of appeal in advertising treatment. And bear in mind, advertising makes its appeal to all classes.

* * *

Advertising sells ideas. That is a dominant purpose of it. It does this by appealing to the tastes . . . the desires . . . the needs of people—dissatisfying them with old things and making them want new things.

It does this by presenting new ideas in a way that is attractive in appearance . . . inviting in appeal . . . clear in expression . . . truthful in word.

For example, advertising doesn't try to sell high grade perfumes in patent medicine bottles—but in crystal bottles of modernistic design.

Ideas are the wings that have borne mankind upward in his path of progress. And Advertising has sold those ideas.

It sold the Bathtub Idea—changed the Saturday night, once-a-week washing celebration, converting it into an every-morning practice. . . . It killed a good deal of business for the tea kettle manufacturer; but it created a much larger trade for plumbers, bathtub makers and automatic water heating manufacturers. . . . At the same time it brought man forward a long step in his progress.

And that is but an example. The transportation idea—converting discomforts of "horse and buggy" travel into luxury, speed and comfort of modern days—has been sold with Advertising which directs its appeal to those instinctive human tastes and desires for improved modes of travel.

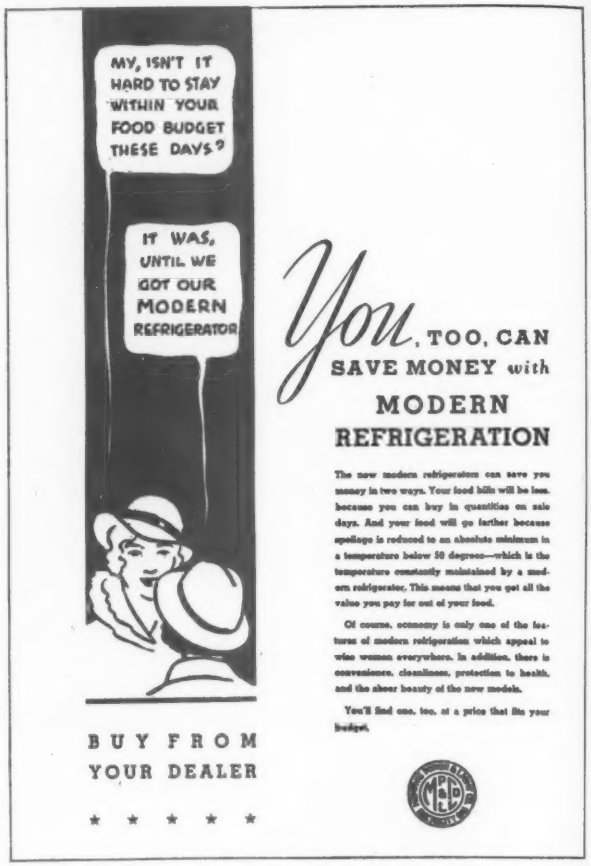
We could call off a long list of Ideas which Advertising has sold, changing man's methods of living, bringing him out of the shadows of the past, into the light of modern living standards; but your own knowledge and imagination can serve you in recalling them.

It is the business of Advertising to find the story of its idea . . . to search out the heart of it . . . to vitalize it and adapt it for appeal. Indeed, art in Advertising is in dramatizing the Idea it seeks to sell.

The great IDEA our industry can exploit to the world has its roots in the *value of utility services.*

Utility services pay the biggest dividend . . . are the best investment . . . are the "biggest buy" in the world market. We ought to sell that idea to our customers. We haven't sold it nearly as hard as it deserves to be sold. Maybe we need to realize it a bit more ourselves. But if we think of it . . . turn it over in our minds . . . search for the real truth . . . analyze what these services mean in terms of comfort, convenience, happiness and welfare to people—then we will more fully appreciate that Utility Services create and maintain conditions for the more abundant

Announcing
This fleet of cars will play an important part in the prompt service you may expect from our new Home Service Dept.
Our New
HOME SERVICE
Beginning today, we are inaugurating a special service for our customers. This service is free. Every home, every homemaker can have the assistance and advice offered by this new department.
Our Home Service Department now embraces a thoroughly trained corps of representatives who are graduate Home Economists.
They are at your service to assist you in an advisory manner in solving the many problems that confront the modern housewife.
The purpose of our company in putting these trained economists at your service is to enable our customers to get the most out of the services of gas and electricity.
These special representatives will advise you on such important questions as whether the lighting in your home is right for proper seeing—whether your present lighting plan gives you the best decorative results—whether you are getting the best possible illumination from the lighting equipment you have now.
They will also advise you on questions of home economics in connection with cooking, modern refrigeration, hot water—hygiene, table cookery, the use of small kitchen appliances, and other household problems that are so important to better living.
TRAINED REPRESENTATIVES
These young women are graduate Home Economists. They have also had intensive schooling under Home Lighting specialists. As members of our Home Service Department they have also received additional training in the proper uses of gas and electric appliances in the home.
A FREE SERVICE—We will be pleased to have our customers make full use of this new service. Telephone 8-1141 and ask for our Home Service Department.
MEMPHIS POWER & LIGHT CO.


MY, ISN'T IT HARD TO STAY WITHIN YOUR FOOD BUDGET THESE DAYS?
IT WAS, UNTIL WE GOT OUR MODERN REFRIGERATOR
BUY FROM YOUR DEALER
★ ★ ★ ★ ★
You, TOO, CAN SAVE MONEY with
MODERN REFRIGERATION
The new modern refrigerators can save you money in two ways. Your food bills will be less, because you can buy in quantities on sale days. And your food will go farther because spoilage is reduced to an absolute minimum in a temperature below 50 degrees—which is the temperature constantly maintained by a modern refrigerator. This means that you get all the value you pay for out of your food.
Of course, economy is only one of the features of modern refrigeration which appeal to wise women everywhere. In addition, there is convenience, cleanliness, protection to health, and the sheer beauty of the new models.
You'll find one, too, at a price that fits your budget.

life, paying dividends to mankind in values that cannot be computed in dollars and cents. The services rendered by Gas and Electricity are not only *necessary* to modern living standards—but they have likewise been chief factors in *creating* these higher standards of living. Without them, Progress would be turned backward half a century . . . we would return to the days of the coal oil lamp . . . be denied a thousand comforts and conveniences we cherish and enjoy today.

In the VALUE of our services Advertising finds the taproot from which it can draw for vitality for its ideas. The job is to interpret it in terms of *human values.*

Electric lighting affords one idea . . . its convenience, contrasted with old methods . . . the progress it represents . . . the protection against physical ailments that scientific lighting offers by preventing conditions causing eye-strain . . . the boon it is to precious—priceless eyesight; . . . and now the light meter that actually measures the amount of light you need for close visual tasks, the requirements of which the I.E.S. lamp meets. That of itself is a story that merits the interest of parents on behalf of their children . . . of school authorities on behalf of pupils in their classrooms . . . of eye specialists, for the patients of whom it is just as important to have proper light as it is to have proper glasses to read and see by.

Another idea that we need to sell is that of the manifold benefits that arise from the use of Health and Labor Saving appliances. These have banished the drudgery of housework . . . have lifted burdens from backs of weary women . . . have brought them out of the kitchen into hours for leisure or pleasure. It is difficult to command words with which to fully express the innumerable benefits that labor saving appliances, using our services, have brought to modern women. I leave it to your own thinking to follow up on this thought.

Still another idea that we have to sell is that of the Radio—which brings the encore of the world's best music . . . its entertainment . . . its cultural courses . . . its informative lectures . . . discussions of governmental affairs . . . the teachings of great religionists—all of these right into the home for enjoyment at the family fireside. What greater story of value . . . of big dividends on an investment, can be told, than is inherent in our story of the enriched life afforded by a radio at the family fireside.

Another story of a different type, but of equal importance to people of modern days is in the Automatic Refrigerator . . . which protects the health of man and his family by preserving food in the safety zone . . . that stands guard, ever watchful, against the dangers to health of food spoilage . . . that relieves the housewife of any thought or care in safely keeping the foods that are entrusted to it. Its appeal is of vital interest to every household.

. Still another idea is arising on the horizon of business and shedding a forecast of its great aid to man's comfort and health. This is Air Conditioning. It appears to be one of the new great industries associated with our services which will shed its benefits to minister to mankind. In it, too, we have a story with which to appeal to the desire for health and comfort that is so largely affected by the temperature in which he lives and works.

And then there is Modern Cookery with the modern range . . . with oven

control . . . automatic lighters . . . insulated oven . . . and all the adaptations that the science of cookery has developed for taking women out of the kitchen and giving her the hours of leisure and enjoyment which she deserves.

It is the business of Advertising to tell the story of the value of these services . . . to create customer demand for them . . . to prepare the way for the salesman . . . and to eliminate the wasted hours and the lost motion of the individual salesman by the mass-production method of telling the world about them.

Advertising lessens sales resistance. It does this because, when thoroughly planned, it reaches an entire community with the advertiser's message—acquaints the public with the essential facts regarding the advertiser's present endeavor . . . does this quickly . . . with less time and effort than direct selling endeavor requires.

In direct selling man hours are often wasted. There is lost motion. At least this is true in doing preliminary work. The mass production method is necessary to eliminate wasted hours and lost motion. Here is where Advertising becomes the mass-production sales tool. It makes calls on prospects at much less cost than the individual salesman can do. It prepares the ground work and lays the foundation for the salesman's call so that the salesman may use his time more effectively to make sales and so make money for himself and save it for his company.

It is able to do these things because of the wide coverage possible, in brief time, through the variety of media available to its use—including the bulletin type of advertising, such as outdoor boards, street car cards, tire covers and truck signs; and the more detailed statements such as may be put into newspapers and direct mail pieces.

Let me pause to remark that the "bulletin type" of advertising is purely Reminder Advertising. It simply reminds people by presenting the *dominant idea* that the advertiser is seeking to impress on the public. Necessarily it must be brief. Specialists in advertising say that these messages should be limited to 10 or 15 words for quick reading.

In the newspapers and the direct mail pieces, more complete statements are available to the advertiser. With illustrations that relate to the subject, and copy that explains the idea, the advertiser may offer "reasons why" his prospect or the casual reader should be interested in his product, his services or his idea. For emphasis it may be repeated that in using this type of media it is possible for the advertiser to go at much more length than in the "bulletin type" of advertising for explaining his message.

A primary purpose of all advertising is to arouse the interest of the reader in the commodity, service or the idea to create desire of ownership or enjoyment.

This prepares the way for the salesman . . . provides for reception of the sales talk . . . makes selling less difficult.

If the advertisement is to accomplish these things for the salesman, it is fundamental that it shall be so presented that it will capture the attention and the interest of the reader; that its appeal shall be so directed that it will invite thoughtful consideration; and that the idea shall

White CANES
From The Commercial Appeal of Wednesday, Sept. 18th, 1935
Blind to Receive White Canes Soon
Blindness is a terrible handicap. Though you may never be blind you may some day be badly handicapped through eye defects caused by eyestrain. One of the best safeguards against eyestrain is good light . . . enough light . . . light in the right place.
PROTECT YOUR EYESIGHT
Take every precaution to preserve your eyesight. It is your most precious possession. If you have eye trouble—if you squint, scowl or frown; if you suffer from headache, nervousness and undue fatigue—have your eyes examined and their defects corrected. See your Eye Specialist at the first sign of trouble. It is especially important for you to have good light for reading, studying, sewing and similar close eye work. Good light is so cheap you cannot afford to suffer the handicap of eye defects caused by lack of good light.
BETTER LIGHT FOR BETTER SIGHT
GOOD LIGHT
Ask for a Free Test of the Lighting in Your Home
CALL 8-1161
MEMPHIS BETTER LIGHT-BETTER SIGHT BUREAU
179 MADISON

Blow Hot—
Blow Cold!
It's always Springtime indoors . . . when your home is air conditioned!
No matter how hot the weather gets outside this summer your home can be as comfortably cool as in early spring-time. No more restless sleepless nights to sap your energy and endanger your health. With air conditioning you make your own weather. Clean—washed, filtered, healthful air circulated in your home all year round. Cooled in summer, heated in winter, to just the degree of temperature you want for health and comfort.
INSTALL
AIR CONDITIONING
SEE THIS DEMONSTRATION
A specially prepared Display Room has been equipped with Air Conditioning in our Building. You are invited to visit it and experience the cool comfort of this modern aid to living comfort. There is no obligation.
BUY FROM YOUR DEALER
MEMPHIS POWER & LIGHT CO.

Examples of some recent advertisements of Mr. Renshaw's company

be clearly understood. Any discussion of those points, however, would lead into the details of planning the production of advertising.

The design of this discussion is to try to indicate the way in which the company's advertising is an aid to the salesmen in their work.

The Signature of the company is of value to the salesman . . . it commits the institution to the statements made . . . becomes a permanent record . . . creates confidence in the idea . . . inspires more complete acceptance in the public mind than the word of an individual in a sales talk might.

In substantiation of that statement, let me refer to a national survey which was reported in the *Commercial Appeal* of Jan. 10, 1936. It states, among other things, that 88 per cent of the people contacted declared that they regarded statements made in advertisements as more reliable than statements made by salesmen. Even the majority of the salesmen themselves, who were contacted in the survey, agreed that printed advertising was apt to be more reliable and dependable than the statements of the average salesman.

For these reasons the advertising writer must be careful to see that each printed word in every statement shall be *believable*—in fact a mirror of truth. . . . In other words it must be so stated that it will be accepted as the truth. Incidentally, the yardstick by which we attempt, in the production of our advertising, to measure the copy, is based upon these four points:

—That it shall be seen
—That it shall be read
—That it shall be understood
—That it shall be *believed*.

Necessarily, as indicated above, the advertising statement cannot be so complete as the sales talk:

—there is not space available
—the cost runs too high (from 10c to as much as $5.00 a word)
—nor can the advertiser compel the reader to give time to his statement.

Hence, for emphasis, let it be repeated—the advertising message must be a clear, concise, truthful statement, designed to create interest on the part of the reader, and arouse desire of ownership or enjoyment.

Salesmen can use the company's advertising profitably. The information the advertising has afforded the public . . . the confidence it has inspired in the product . . . the interest it has aroused—

(Continued on page 70)

Fred D. Corey

Fred D. Corey, President of the Niagara, Lockport and Ontario Power Company, died of heart disease in his home at Buffalo, N. Y., on February 4th. He was seventy-three years old.

Mr. Corey was born near Watertown, N. Y., and was graduated from the law department of the University of Buffalo in 1892, having taught school for six years. He practiced law in Buffalo until 1915. Since then he had headed the Niagara, Lockport and Ontario Company. He was chairman of the executive committee of the Buffalo, Niagara and Eastern Power Corporation; President of the Bradford Electric Company, the Lockport and Newfane Power and Water Supply Company, and the Lower Niagara River Power and Water Supply Company.

He was associated with other power companies and several real estate firms. He was a member of the American, New York State and Erie County Bar Associations, and Lawyers' Club of New York City and the Buffalo Chamber of Commerce, the National Republican Club, the Congressional Country Club at Washington and others.

Eugene Rosenquest

Eugene H. Rosenquest, President of the Westchester Lighting Company, and the Bronx Gas and Electric Company, died of a heart attack at 6:30 p. m. Jan. 26, in Lawrence Hospital, Bronxville, N. Y. He was taken ill on Saturday after attending the theater with Mrs. Rosenquest.

Mr. Rosenquest was born in Tarrytown, N. Y., on May 18, 1869. He was educated in the public schools there and at Trinity School in New York City. At 18 years of age he took his first job in the Tarrytown Post Office. Later he worked with a contracting firm in New York City, and subsequently he became manager of the publishing firm of Charles L. Webster & Co., which was Mark Twain's publishing house. The panic of 1892 left him without a job, and he found employment in Minnesota with the St. Louis River Water Power Company, which was being developed by J. Cooke, of Philadelphia.

In 1896 he went with the Bronx Gas and Electric Company, a newly formed utility in what was then the town of Westchester, Westchester County, as superintendent. In 1898 he became vice-president and general manager, and in 1901 president of this company. In April, 1926, he was elected president of the Westchester Lighting Company and in January, 1932, he became president also of the Yonkers Electric Light and Power Company.

Mr. Rosenquest lived in Bronxville. He leaves a widow and four sons.

Funeral services were held at Bronxville, and burial was at Philadelphia. Honorary pall-bearers were Judge William L. Ransom, Floyd L. Carlisle, Frank W. Smith, Oscar H. Fogg, Stuart Wilder, George B. Cortelyou, Clifford E. Paige, Philip Torchio, E. P. Prezzano, Robert B. Grove, F. H. Nickerson, William L. Diehl, George T. Adee, and Presley Bisland.

William H. Horton

William H. Horton, Sales Promotion Manager, West Penn Power Company, Pittsburgh, died February 9, 1936, in Elizabeth Steel Magee Hospital after a brief illness.

Mr. Horton had been exceedingly active in State and National Association endeavors, and was a recognized authority on many technical subjects. His work on committees of the Edison Electric Institute has been of particular value to the industry.

He was born in Delavan, Wisconsin, and was graduated from the Massachusetts Institute of Technology, Class 1910, in Electrical Engineering.

Previous to his employment with West Penn he had been with the Telluride Power Company in Utah; General Electric Company at Denver; Electric Bond and Share Company in New York, and in the United States Army service.

After a year as Assistant to the Vice-President of West Penn Power Company, Mr. Horton was appointed Distribution Manager in 1921; Assistant Commercial Manager in 1926, and in 1928 was appointed to the managership of the Sales Promotion Department.

Mr. Horton resided at Brookside Farms, South Hills, Pittsburgh, and is survived by his wife, Elsie Connell Horton, and his 14-year-old son, William Henry Horton.

Current Problems in Rural Electrification

By E. A. White

Director, Committee on the Relation of Electricity to Agriculture

Given Dec. 9, 1935, as part of the course on Current Trends in the Public Service Industries, Northwestern University School of Commerce

STRANGE as it may appear, there never has been a generally accepted definition of the term "Rural Electrification." The Funk & Wagnalls dictionary defines "rural" as "pertaining to the country as distinguished from a city or town." This definition undoubtedly gives the generally accepted meaning of the word "rural," but does it apply to the field of Rural Electrification? If so, just where would you draw the line so as to say "Here we have Rural Electrification" and "Here we have urban electrification"?

Certainly one, if not the most widely accepted, application of the term "rural" is that established by the United States Bureau of the Census with reference to population statistics. The line is drawn in the following language: "Urban areas, as defined by the Census Bureau in recent censuses, have included all cities and other incorporated places having 2500 inhabitants or more. For use in connection with the 1930 census the definition has been slightly modified and extended so as to include townships and other political subdivisions (not incorporated as municipalities, nor containing areas so incorporated) which had a total population of 10,000 or more, and a population density of 1000 or more per square mile." The balance of the population not included in the above definition was classified as rural.

Here a very definite line is drawn. If you live in a town or city of 2500 population or over, you are an urban dweller. Otherwise, with a few exceptions, you are a rural dweller. While the wisdom of this definition as applied to population statistics has seldom been seriously questioned, it has not been so used as applied to Rural Electrification.

Some years ago the following limitations were established by state regulatory bodies:

Wisconsin: "The farmer or other customer of electrical energy who is not located within the corporate limits of any city or village, or in other territory having similar character or density of population."

Illinois: "Any customer, except industrial light and power customers, located outside the corporate limits of an incorporated municipality."

Indiana: "One whose premises are without the corporate limits of a municipality and one requiring an investment per customer's unit demand greater than is ordinarily required for customers within municipalities."

DR. WHITE

Many other similar definitions might be given, but these typical ones are sufficient to indicate that the definition of "rural" as applied to electric service has not been given as broad an application as when used from the standpoint of population statistics.

When one considers the general problems of electric service and the rates to be charged for the same, it would appear logical to follow the definitions of "rural" as indicated by the state regulatory bodies and define Rural Electrification as electric service rendered outside the limits of incorporated cities or towns.

On the basis of this definition the information presented in Table I has been compiled.

TABLE I

Rural population	44,637,188
Per cent of population, rural	36.4
Per cent of rural population with electric service, 1932	24.7
Non-farm customers, 1932	2,000,000
Farm customers, 1932	709,449
Total rural customers, 1932	2,709,449
Electrical energy used annually in rural areas (est.)	3,860,000,000 kwhr.
Per cent of energy sold, used in rural areas	5.5

During the past two and one-half years the number of farm customers served has increased to 759,160, or approximately 7 per cent of the number served at the end of the year 1932. If there has been the same rate of increase in non-farming rural customers, the total number of rural customers will be as given in Table II.

TABLE II

Non-farming rural customers	2,140,000
Farm customers	759,160*
Total rural customers	2,899,160

* Editor's Note: 790,000 farm customers as of Dec. 31, 1935, E. E. I. Statistical Department.

From these figures it will be found that today there are approximately three non-farming rural customers for each farm customer. In certain regions, particularly the East, the ratio is above this average, while in regions such as the Middle West it falls below the average.

It has been estimated that there are some 1,400,000 potential non-farm rural customers without electric service today, and, on the basis of 1930 figures, 5,529,488 farms. It is reported that the 1935 figures will increase the total number of farms as much as 500,000, so we can count on more farms than are listed above. However, taking the 1930 figures for total number of farms, we find that today, instead of having three non-farm rural customers for each farmer, as was the case in territory already served, the ratio is reversed, and in unserved territory we find approximately four farmers for each non-farmer. Thus the present rural electric problem becomes largely a farm electrification problem, which means a lower customer density on future rural lines.

Cost of Serving Rural Customers

As the cost of serving rural customers varies with local conditions, it has been

considered advisable to present one example which clearly illustrates the fundamentals involved. For some conditions the figures presented may be too high; for others, too low. The estimate is based on the following assumptions:

TABLE III

Cost of line per mile	$1230.00
Interest on investment	6%
Depreciation	3%
Taxes and insurance	2½%
Cost of energy	.01 per kwhr

In addition to the above, nominal charges are made for administrative expenses, business development, meter reading, billing, etc.

The costs per year per mile of line are summarized in Table IV.

No matter how these figures may be changed nor how much the costs may be reduced, it is demonstrated that the road to a low cost per kwhr is through volume use. More will be said regarding this later.

Farm Electrification

As the Rural Electrification problem is becoming more and more a farm electrification problem, it might be desirable to look at the situation as it exists today.

In Table V there is presented information with reference to the number of farms served, by states, for the year 1923, and the middle of the year 1935. The arrangement has been made in the order of the latest figures for percentage of farms with electric service, placing New Hampshire, with 66.6 per cent, at the top, and Mississippi, with less than 1 per cent, at the bottom.

The increase in the number of farms served, by years, is given in Table VI.

TABLE VI

Years	Total Number of Farms Served	Increase Over Previous Year
1923	177,561	.....
1924	204,780	27,219
1925	246,150	41,370
1926	309,125	62,975
1927	393,221	84,096
1928	506,242	113,021
1929	576,168	69,926
1930	649,919	73,751
1931	698,786	48,867
1932	709,449	10,663
1933	713,558	4,109
1934	743,954	30,396
June 30, 1935	759,160	15,206
Dec. 31, 1935	790,000	46,046

In Table VII there is given the amount of electrical energy used by agriculture for the years 1933 and 1934, together with the average price paid for the same for two regions.

For the year ending June 30, 1935, it is reported that electrified farms east of the 100th meridian used an average of 828 kwhr, while those west of this line used 5708 kwhr. This 100th meridian is used as the dividing line between the irrigated and non-irrigated farming regions.

In view of the fact that Rural Electrification of the next decade will be

TABLE IV

	Annual Kwhr Per Mile of Line							
	2400	3000	4500	6000	9000	12,000	15,000	18,000
Fixed Charges	$141	$141	$141	$141	$141	$141	$141	$141
Operating Expense	113	113	113	113	113	113	113	113
Energy Charge	24	30	45	60	90	120	150	180
Total Cost	$278	$284	$299	$314	$344	$374	$404	$434
Cost per Kwhr (cents)	11.6	9.5	6.7	5.2	3.8	3.1	2.7	2.4

TABLE V—NUMBER AND PERCENTAGE OF FARMS SERVED—1923 AND JUNE 30, 1935

	Number of Farms April, 1930	Farms Served on December 31, 1923 Number	%	Farms Served on June 30, 1935 Number	%
Total United States	6,288,648	177,561	2.8	759,160	12.1
New Hampshire	14,906	2,396	11.4	9,924	66.6
Utah	27,159	3,330	12.9	16,435	60.5
Connecticut	17,195	2,626	11.3	10,364	60.3
California	135,676	32,064	23.5	81,255	59.9
Rhode Island	3,322	400	10.2	1,969	59.3
New Jersey	25,378	1,000	3.4	14,937	58.9
Washington	70,904	13,400	18.3	41,172	58.1
Massachusetts	25,598	2,440	7.3	14,493	56.6
Arizona	14,173	225	2.1	5,638	39.8
New York	159,806	16,000	8.5	58,337	36.5
Maine	39,006	5,676	11.3	14,202	36.4
Idaho	41,674	5,050	12.5	14,228	34.1
Oregon	55,153	5,250	9.4	18,500	33.5
Vermont	24,898	2,384	8.6	8,059	32.4
Nevada	3,442	125	3.2	967	28.1
Pennsylvania	172,419	12,918	6.5	45,780	26.6
Michigan	169,372	2,996	1.6	44,039	26.0
Ohio	219,296	16,803	6.6	50,723	23.1
Wisconsin	181,767	7,429	3.9	39,760	21.9
Delaware	9,707	105	1.0	1,806	18.6
Maryland and Dist. Col.	43,307	1,000	2.0	6,879	15.9
Iowa	214,928	11,237	5.3	32,243	15.0
Illinois	214,497	2,201	1.0	28,885	13.5
Indiana	181,570	3,228	1.6	24,454	13.5
Colorado	59,956	1,118	1.9	7,285	12.2
Florida	58,966	353	0.6	5,588	9.5
Virginia	170,610	2,100	1.1	15,293	9.0
Kansas	166,042	900	0.5	13,509	8.1
Minnesota	185,255	3,339	1.8	13,926	7.5
Nebraska	129,458	790	0.6	9,612	7.4
Missouri	255,940	2,913	1.1	18,312	7.2
Montana	47,495	550	1.2	2,826	6.0
West Virginia	82,641	215	0.2	3,831	4.6
Alabama	257,395	1,000	0.4	11,261	4.4
New Mexico	31,404	250	0.8	1,350	4.3
Tennessee	245,657	1,350	0.5	9,875	4.0
North Carolina	279,708	2,100	0.7	9,959	3.6
Kentucky	246,499	3,411	1.3	8,569	3.5
South Dakota	83,157	483	0.6	2,862	3.4
Wyoming	16,011	280	1.8	536	3.3
Oklahoma	203,866	1,600	0.8	5,727	2.8
Georgia	255,598	137	0.1	7,016	2.7
North Dakota	77,975	114	0.2	1,978	2.5
South Carolina	157,931	900	0.5	3,784	2.4
Texas	495,489	2,100	0.5	11,623	2.3
Louisiana	161,445	275	0.2	3,138	1.9
Arkansas	242,334	500	0.2	3,427	1.4
Mississippi	312,663	500	0.2	2,824	0.9

TABLE VII

	Year, 1934	Year, 1933
States Approximately East of 100° Meridian		
Farms served	534,203	507,522
Kilowatthours sold	425,432,000	388,549,000
Revenue	$26,025,000	$25,041,800
Kilowatthours per farm	814	770
Average annual bill	$49.82	$49.65
Revenue per kilowatthour	6.12c	6.45c
States Approximately West of 100° Meridian		
Farms served	209,751	206,036
Kilowatthours sold	1,432,022,000	1,243,994,000
Revenue	$23,157,600	$21,460,100
Kilowatthours per farm	6,833	6,038
Average annual bill	$110.49	$104.16
Revenue per kilowatthour	1.62c	1.73c

largely farm electrification, it is perhaps worth while to look at some of the high points of this development to date.

The progress has been most marked in nineteen states in each of which more than 20 per cent of the farms now have electric service (Table V). This percentage varies from 21.9 for Wisconsin to 66.6 for New Hampshire. Thus we find this development concentrated in seven states of the Far West where there is an irrigation pumping load on the farms; in three states of the Middle West, and the nine northeastern states.

The Far West development is accounted for by the large amount of electrical energy used for irrigation pumping. In fact, the farmers of California use more electricity annually than do all the other farmers of the United States. In the Middle West and eastern states a variety of factors have been combined to stimulate progress. In the first place, the percentage of tenant farmers is relatively low; then, the average income is relatively high; there are a large number of non-farm rural residents, and farms are not so large as in other agricultural sections. Furthermore, especially in the eastern states, the percentage of urban to rural population is relatively large, making it possible for many utility companies to offer most attractive rates to rural customers.

With the more densely populated rural areas being covered with lines, the problem becomes one of reducing the cost of rendering the service to a minimum and developing sufficient load to bring the cost per kilowatthour within reach of the farmer.

The figures in Table IV demonstrate how rapidly the cost per kilowatthour declines with increased use. This is further emphasized by the figures in Table VII, where we find, for the year 1934, farmers west of the 100th meridian, at an average cost of 1.62 cents per kilowatthour, purchased more than eight times as much energy for a gross annual charge only a little over twice that of the farmers east of the 100th meridian, whose average cost was 6.12 cents per kilowatthour.

When the average price now paid by rural customers for electrical energy is compared with the costs given in Table IV, it would appear that, on the average, rates are now as low as can reasonably be expected. In fact, it would appear that in some cases the charges are now below the reasonable cost of the service.

Rates and Rate Forms

Right here is as opportune a time as any to interject a brief discussion on rural rates and rate forms. To cover this subject thoroughly would require the preparation of manuscript for a fair-sized book. It is my guess that nearly every conceivable rate form has been tried somewhere at some time or other in the rural field.

In the Far West, where the farm use of energy is large, we find the typical demand charge with various-sized blocks of energy ranging from three to below one cent per kilowatthour, the total charges being low enough to bring the average charge down to the 1.62 cents per kilowatthour reported in Table VII.

In the Middle West, South, and East, there are still many rate forms in use. A few will be described briefly.

Example I. The rural customer is required to pay the utility company an estimated difference in cost between that for his service and that for urban residential service. The rural customer is then allowed to pay for his service at urban residential rates.

Example II. The rural customer is furnished service at urban residential rates, but there is an annual minimum revenue required. While the amount of this minimum varies, one-fifth of the cost of the line is a figure frequently used.

Example III. The utility company names a maximum investment per customer in the cost of the line and then has a fixed monthly charge varying with the size of transformer required. Energy is furnished in blocks ranging from a top of eight cents per kilowatthour or less down to as low as one and one-half cents per kilowatthour.

After all is said and done, it is not the rate form but the amount of money involved which is the primary consideration in the Rural Electrification field. While rates probably will always be too high from the viewpoint of the purchaser and too low from the standpoint of the seller and therefore seldom considered permanently settled, it can be said that on the average rural rates are low enough today, when compared with the cost of rendering the service, so that we must look elsewhere to find the primary problem of extending electric service further into rural areas.

Line Costs

The costs of building electric lines to serve rural customers have been materially reduced during the past ten years. With the present price level, little can be looked for in further reducing these costs with our overhead distribution system.

At the present time experiments are being conducted with underground distribution for rural service. If the results should be satisfactory there might be a reduction in depreciation and maintenance costs when compared with overhead distribution, even though the original cost might be slightly higher.

Thus it appears that the possibility of materially reducing the cost of line construction is not especially promising with our present technical development.

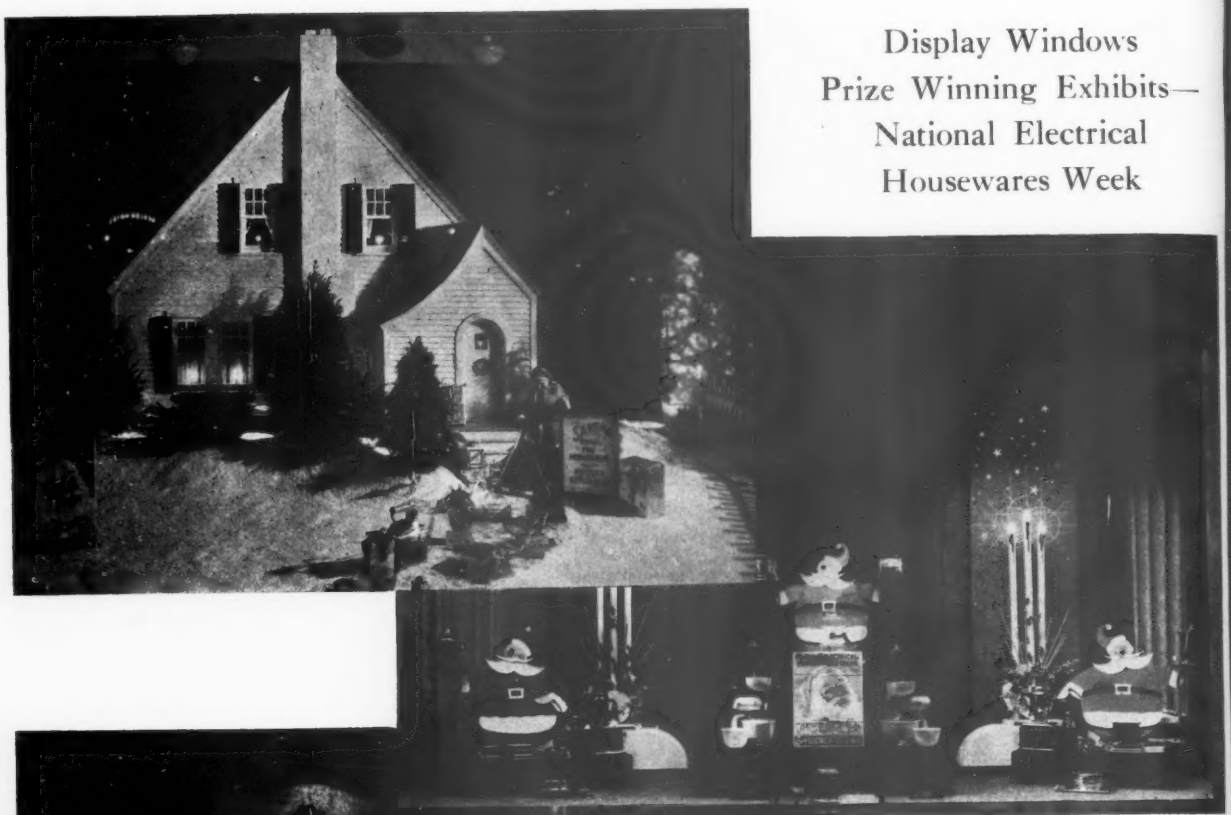
The Real Rural Electrification Problem

It is evident that rural electric development has flourished most vigorously in those areas where sufficient load could be developed to furnish income which would justify the expenditures necessary to provide the service. This may be due to either density of population, types of agriculture, or some undertaking which can use a large amount of energy, such as irrigation. Therefore, with a decreasing density for prospective customers it would appear that the major problem is—How much electricity will the farmer use?

In the present status of electrical de-

(Continued on page 72)

Display Windows Prize Winning Exhibits— National Electrical Housewares Week



ABOVE—*First Prize, Utilities Division. Minnesota Power and Light Co., Duluth, Minn.*

UPPER LEFT—*Second Prize, Utilities Division. Wisconsin Gas and Electric Company, Waukesha, Wis.*

ABOVE—*First Prize, General Dealers Division. Hanson Electric Co., Duluth, Minn.*

RIGHT—*First Prize, Department Stores Division. Fowler, Dick & Walker, Inc., Binghamton, N. Y.*

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Our Contribution to Better Business

By C. E. Greenwood

Commercial Director, Edison Electric Institute

IT does not need a soothsayer to predict that the momentum of national commercial programs activated in 1935 will continue to stimulate public interest and help to carry records to new higher totals for the coming year. Granting that a presidential campaign, with the many uncertainties that it produces, is a governing factor in the marketing of any product in 1936, it appears that our chances in the electrical industry are about as good as any. They will be what we make them, and if the other fellow beats us out, we can place the blame on our own shoulders.

But our commercial work has never been more expansive nor more effective. The major programs sponsored by the industry in conjunction with electrical manufacturers are making satisfactory accomplishment. As the "Happy Warrior" would say, "Let's look at the record."

Better Light-Better Sight

The Lighting Program starts its third year auspiciously. The opinion prevails generally that the Better Light-Better Sight movement has been one of the greatest contributing factors of all times in putting a foundation under the lighting load, and in adding vigor to the forward push. We find the utility companies, practically without exception, operating lighting programs of varying degree in size and aggressiveness, with more men and women contacting the consumer, more money being spent in newspaper advertising and more promotional material being distributed. Likewise we note more unified action of manufacturer and dealer in gaining advantage locally of the National Program. We find the optical industry interested and informed on the Better Light-Better Sight Program, and LIGHT PRESCRIBING in the optical industry is taking root.

The scientific lamps developed from specifications prepared by the I.E.S., including both technical requirements and minimums of effective illumination (the latter having the approval of E.E.I.), have been popularized in an amazingly short period through joint effort of the manufacturers of incandescent lamps and lighting equipment, the utility companies and other dealers.

The 999,999th and the 1,000,000th certification tags were issued to the Colonial-Premier Company in early January, and a specially designed lamp bearing the 999,999th tag was presented by that company to Mr. M. E. Skinner, chairman of the Better Light-Better Sight Bureau. This volume selling of "lamps for seeing" is indication of what still can be done in the way of approved illumination in the home. It is anticipated that shortly there will be specifications prepared which will guarantee "fixtures for seeing" as well as lamps. A study of lighting on our highways and its relation to the hazards of night driving is now being undertaken.

Among the later plans of the Executive Committee of the Bureau, are a slide film for adult audiences now in process of development. One was produced last year for use in schools or before audiences of children.

Electric Table Service Saves

Believe it or not, the statistical wizards showed us figures for the sales of small appliances that indicated a sharp comeback. December sales in particular pleased the most optimistic predictions. The Electrical Housewares Committee takes some of the credit, because December closed a year of coordinated effort to take small appliances out of the "passive" class among merchandisers, and to bring them into the limelight.

The first National Electrical Housewares Week was a real success. Approximately 75,000 window posters were distributed, many thousands of colored stickers, and a large supply of newspaper mats. The display contest, with $600 in prizes offered in three classes, namely, departmentalized stores, utilities and general dealers, brought approximately 150 entries. This was the fourth of a series of contests carried through during 1935. The winners of these prizes were:

Department Stores:

First Prize—Fowler Dick & Walker, Inc., Binghamton, N. Y.

Second Prize—Ziesel Brothers, Co., Elkhart, Ind.

Honorable Mention—Boggs & Buhl, Pittsburgh, Pa. Fowler Dick & Walker, Inc., Wilkes-Barre, Pa. Elder & Johnston Co., Dayton, Ohio. Vandever Dry Goods Co., Inc., Tulsa, Okla. Rike Kumler Co., Dayton, Ohio.

Utilities:

First Prize—Minnesota Power & Light Co., Duluth, Minn.

Second Prize—Wisconsin Gas & Electric Co., Waukesha, Wis.

Honorable Mention—Philadelphia Electric Co., Philadelphia, Pa. Utah Power & Light Co., Ogden, Utah. Consumers Power Co., Jackson, Mich. Public Service Co. of New Hampshire, Manchester, N. H. Kansas City Power & Light Co., Kansas City Mo.

General Dealers:

First Prize—Hanson Electric Co., Duluth, Minn.

Second Prize—Central Electric Co., Watsonville, Calif.

Honorable Mention—L. F. Woodhead, Roswell, New Mexico. Hollister-Electric-Inc., Dayton, Ohio. Ernst Hardware Co., Seattle, Wash. Electric Service & Supply Co., Aberdeen, Wash. Maxwell Hardware Co., Berkeley, Calif.

Working on the sound basis that "Goods well displayed are half sold," the committee has been trying to stimulate interest in novel and attractive store and window displays.

In 1936 it is planned to have four Concentrations. April will be Electrical Housekeeping Month; June will be Electrical Wedding Month; October, Electric Buffet Entertaining Month, and in December, the Second National Electrical Housewares Week will be staged. In each concentration there will be a special poster issued for all utilities and dealers participating.

The news medium *Electrical Housewares* will continue to carry information relative to each of these quarterly activities. This is an innovation in the promotion of the small appliance field and will continue as a joint activity of the Institute and appliance manufacturers in N.E.M.A.

Running Water—Your Family Deserves It

The success of the Running Water Program has justified its continuance. The sales objectives for 1935 were accomplished, and the pump manufacturers which have joined with the Edison Institute in this rural service venture are

in hearty accord for continuing another year, although the termination date was originally set for December, 1935. It is one of those programs that is too good to close. The sale of water systems continues at an accelerated pace. This program also carries along social and educational advantages to the consumer in rural and semi-rural districts.

This year a booklet will be used as the form of promotional medium instead of broadsides. It has been attractively prepared and contains a series of reasons, subtly developed, why the rural user of electricity should not be without running water in the home and on the farm. Samples of this booklet, identified by the name of *Life in the Country*, have been distributed to all utility companies. It is furnished free with the provision that each booklet will be distributed by a salesman or other employee to selected prospects. There will be an early printing and mailing of many thousands of this promotional piece. Mr. P. H. Powers, chairman of the Electric Water Systems Council, which motivated and controls this activity, predicts even greater sales achievement in coming months than for 1935.

Modernize-Electrify Your Kitchen

The original prospectus has been revised in order to bring the National Kitchen Modernizing Bureau into line with practical policies of local utilities. The revised edition was mailed in early February, and Chairman George E. Whitwell has set late February as the time when it is expected several thousand Plan Books outlining national and local activity will be issued to utilities, manufacturers, wholesalers, contractors, leagues and other groups.

The slogan of the Bureau—MODERNIZE-ELECTRIFY YOUR KITCHEN — with the design approved and copyrighted by the Bureau is illustrated herein. It is expected that this will be carried in the national advertising of manufacturers, in the local advertising of utilities and dealers, on poster boards and other promotional pieces, and will become as popular as other slogans of national programs sponsored by the Institute.

It is of general interest that kitchen modernizing through electrifying has attracted the attention of some of the leading writers of national magazines on home economics. The women's viewpoint in connection with our Kitchen Modernizing Program is all-important, and in order to bring the reaction of our

home service groups throughout the utility field to the Executive Committee, Miss Clara Zillessen, Advertising Manager of Philadelphia Electric Company, and Miss Florence Freer, Home Economics Director of Brooklyn Edison Company, have been appointed members of the Plan Committee of the Bureau.

Dr. G. W. Allison is touring the Northwest and West Coast in the interest of the National Kitchen Modernizing Program. "Doc's" itinerary takes him to Omaha, Denver, San Francisco, Los Angeles, Fresno, Medford and Portland, Ore., Seattle, Spokane, Kansas City, Minneapolis, Milwaukee and Chicago.

The Courage of Kay

The sound film sponsored by E.E.I. and national advertisers to cooperate with Federal Housing Administration is increasing in popularity. It has been shown in many gatherings from coast to coast and has been received with general satisfaction. Many utility companies and electrical manufacturers have purchased these films, and in addition to the showings under the guidance of utilities, they have been placed generally at the disposal of local Federal Housing Committees for public showings. All companies and associations desiring to sell the big idea of kitchen modernizing by electrifying should not fail to make arrangements for putting on *The Courage of Kay*. It has an all-Hollywood cast, and is an entertaining story. Application can be made direct to the Commercial Department, E.E.I., or to the producer, Mason Wadsworth, 551 Fifth Avenue, New York City.

With the Committees

At the meeting of the *Air Conditioning Committee* at Chicago in January, Chairman Michel laid plans for the preparation of complete information for the Air Conditioning Report of 1936. These reports of our committee are accepted as the best publications for informative data on equipment and operating costs in the field of air conditioning. Attempt is being made to obtain accurate data on commercial, industrial and domestic installations, room cooling units and attic and kitchen ventilation.

The coordinating committee of the Air Conditioning Manufacturers Association headed by J. J. Nance of Frigidaire Corporation as chairman has been established. One of the subjects now under advisement is a *Definition* of air conditioning that has been published by the National Better Business Bureau on behalf of the American Society of Heating and Ventilating Engineers, the Air Conditioning Manufacturers Association, the American Society of Refrigerating Engineers, and other groups that have approved it to date, and are giving it their hearty support. The objective in defining air conditioning is to prevent the name of this service, which is now rapidly gaining popular acceptance, from being adversely affected by its application to gasoline, shoes, and certain humidifying and ventilating gadgets.

* * *

The first issue of *Rural Electrification Exchange* with P. M. Alden, Philadelphia Electric Company, as Editor, was issued in January. This will be continued bi-monthly sponsored by our Rural Sales Committee.

* * *

A subcommittee of the Wiring Committee has undertaken jointly with representatives of National Electrical Manufacturers Association, National Electrical Contractors Association, Illuminating Engineering Society, and other groups interested in wiring specifications to prepare and publish "A Handbook of Wiring Design." The Committee is headed by E. A. Brand of Niagara Hudson Power Corporation.

* * *

"Commercial Sales" is the name of a new subcommittee of the Sales Committee that has been organized to study and develop further interest in load building services and equipment in the class under 25 kilowatts. Although some of our companies have always placed emphasis on this classification of business, others have neglected this group during recent years for good and sufficient reasons. Herein lies a potential market of large proportions for electric

commercial cooking, refrigeration, electric heating, air conditioning, improved lighting and other services. The Committee, now in formation, is headed by Kemp G. Fuller of American Water Works & Electric Company, New York City.

* * *

H. S. Beagle, New York Power & Light Company, Albany, N. Y., has been appointed chairman of the Lighting Sales Committee, succeeding Julius Daniels of Boston who has been obliged to resign from the position because of the pressure of local activity. This Committee ties in its efforts closely with the Better Light-Better Sight Program. The major activities which are in the mill for the early months of 1936 are lighting in commercial and industrial establishments, and highway lighting. The stunning motor accident toll on the highways has directed attention to the relationship of lighting to accident prevention, and the Committee has under advisement this phase of the subject.

* * *

Chairman H. C. Webb, Jr. of the Industrial Power and Heating Committee will feature among the many important functions of his Committee a National Power Sales Conference on March 23 and 24 at the Edgewater Beach Hotel, Chicago. The Program has been distributed to utility companies, and it is anticipated that there will be a large attendance at this first venture of its kind. A meeting of the industrial power salesmen of utility companies is opportune, and a glance at the Program will convince Chief Executives of our member companies that it will be to the interest to have their power engineers participate, and value received with interest will come from attendance.

* * *

General Sales Conference

The Third Annual Sales Conference of E.E.I. has been announced for March 24 and 25. The Program is now being prepared and will have early distribution. H. P. J. Steinmetz, chairman of the Sales Committee, and those in charge of the Conference, are confident of a large and enthusiastic meeting. All Commercial Executives are urged to attend themselves and to bring as many key representatives with them as possible.

Manufacturers of electrical equipment interested with the utilities, and having a stake in their load building activities, are cordially invited to attend.

SALES—ELECTRIC REFRIGERATORS

(Household Models Only)

MONTH OF DECEMBER AND TWELVE MONTHS OF 1935 AND 1934

	Month of December, 1935	Month of December, 1934	Month of November, 1935	Twelve Months, 1935	Twelve Months, 1934
Total United States	*75,904*	*71,477*	*46,930*	*1,590,023*	*1,372,526*
Maine	138	267	98	7,706	7,044
New Hampshire	131	260	105	5,647	4,884
Vermont	88	215	14	3,460	2,944
Massachusetts	3,293	1,755	2,238	64,878	52,322
Rhode Island	200	331	253	7,949	8,007
Connecticut	630	592	561	24,011	18,786
Total New England	4,480	3,420	3,269	113,651	93,987
New York	10,857	9,319	7,421	191,736	190,055
New Jersey	3,996	2,495	2,881	68,212	59,858
Pennsylvania	7,958	4,794	4,454	125,564	121,971
Total Middle Atlantic	22,811	16,608	14,756	385,512	371,884
Ohio	4,673	3,383	4,607	105,028	91,321
Indiana	1,381	2,520	1,433	39,282	35,551
Illinois	6,917	14,514	2,955	153,868	108,333
Michigan	5,199	5,248	2,869	68,107	54,092
Wisconsin	1,205	777	633	26,507	21,356
Total East North Central	19,375	26,442	12,497	392,792	310,653
Minnesota	1,457	976	320	22,284	17,897
Iowa	344	752	289	24,563	20,677
Missouri	1,912	2,842	1,527	46,457	53,760
North Dakota	137	136	29	4,083	3,223
South Dakota	143	306	41	5,171	4,350
Nebraska	715	210	321	16,787	14,477
Kansas	497	983	478	19,368	21,541
Total West North Central	5,205	6,205	3,005	138,718	135,925
Delaware	224	91	34	3,333	3,083
Maryland	975	888	448	22,067	25,770
District of Columbia	285	477	36	11,965	12,825
Virginia	1,486	1,878	303	22,769	22,821
West Virginia	551	695	242	15,998	18,170
North Carolina	618	855	336	25,732	20,883
South Carolina	416	393	327	13,171	9,910
Georgia	1,156	333	479	28,766	29,363
Florida	987	1,202	2,388	27,883	17,591
Total South Atlantic	6,698	6,812	4,593	171,684	160,416
Kentucky	827	729	660	18,077	19,865
Tennessee	691	403	408	25,209	26,822
Alabama	1,862	403	386	23,660	16,914
Mississippi	(34)	87	13	7,140	5,182
Total East South Central	3,346	1,622	1,467	74,086	68,783
Arkansas	54	523	31	9,971	9,350
Louisiana	538	440	510	15,153	10,008
Oklahoma	308	538	465	17,157	17,900
Texas	1,508	1,659	1,545	63,930	53,078
Total West South Central	2,408	3,160	2,551	106,211	90,336
Montana	170	253	37	6,406	5,262
Idaho	178	187	26	7,118	4,457
Wyoming	60	148	19	2,520	2,337
Colorado	703	308	65	12,169	10,645
New Mexico	69	62	56	3,318	2,470
Arizona	109	373	57	5,725	3,857
Utah	104	230	89	7,364	6,005
Nevada	137	72	32	2,006	1,305
Total Mountain	1,530	1,633	381	46,626	36,338
Washington	702	781	671	22,498	18,438
Oregon	682	563	171	14,988	15,471
California	8,667	4,231	3,569	123,257	70,295
Total Pacific	10,051	5,575	4,411	160,743	104,204

Figures based on report issued by the National Electric Manufacturers Association E.E.I. 1-31-36.

BOILERS, ECONOMIZERS, AIR HEATERS AND PIPING 1935

A Report of the Boilers Subcommittee of the Prime Movers Committee, Edison Electric Institute

Leakage and tube starvation in boilers, and deficient steam temperatures and tube failures in superheaters have required the use of corrective measures, which have usually been successful. Water wall and economizer operation has been satisfactory, but considerable trouble with air preheaters has been reported. The use of steam washers in boiler drums has, in one case, reduced turbine deposits.

The behavior of metals at high temperatures and detailed information concerning welding of piping are covered.

Proper precautionary measures must be taken in laying up boilers to prevent corrosion.

Boiler availability for high pressure units compares favorably with, or exceeds, the turbine availability.

In foreign boiler developments, the use of unconventional designs is still prevalent to a marked degree.

Manufacturers' statements include descriptions of recent designs and installations of boilers and auxiliary equipment

Publication No. C4
Published July, 1935
Price 60c to members and their employees
Price $1.50 to non-members in U.S.A.

STEAM AND ELECTRICAL REQUIREMENTS OF OFFICE BUILDINGS

A Report of the Sales Committee, Edison Electric Institute

The purpose of this report is to provide a group of basic factors that may be used to determine the approximate steam and electrical requirements of office buildings.

The report gives tables of unit consumption derived from tests and operating data on a large number of office buildings in Philadelphia, New York City, St. Louis, Chicago, Boston, Michigan and Georgia. Included also are curves which have been developed from these data showing the relation between outdoor temperature and building heating; between outdoor temperature and exhaust steam wasted by an isolated power plant, and between lighting consumption and hours of sunshine per month. Supplementing these tables and curves is an example of the method followed by one operating company in developing the comparative heat, light and power costs of a building with an isolated power plant and the same building with purchased electric service.

Publication No. C2
Published April, 1935
Price 30c to members and their employees
Price 75c to non-members in U.S.A.

COMBUSTION 1935

A Report of the Combustion Subcommittee of the Prime Movers Committee, Edison Electric Institute

This report contains statements by the Subcommittee, Operating Companies, and Manufacturers on:

Combustion of Oil and Gas Fuels
Combustion Control
Furnaces (other than pressure parts of water-cooled furnaces)
Stokers
Ash and Dust Elimination and Ash Disposal Equipment
Mechanical Draft Equipment
Pulverizers and Pulverized Fuel

Publication No. C6
Published August, 1935
Price 80c to members and their employees
Price $2.00 to non-members in U. S. A.

SYMBOLS FOR METERING DIAGRAMS

A Report of the Electrical Equipment Committee, Edison Electric Institute

Confusion has been caused in the past due to lack of uniformity in meter symbols, vector diagrams and conventions As a guide to authors in the discussion of meter problems and the preparation of papers, these symbols and conventions have been worked out in order to:

1. Simplify wiring diagrams.
2. Make comparisons of different methods easier
3. Facilitate checking of diagrams and connections

It is recommended that these conventions be used by manufacturers, utilities and others in all manuscripts prepared for publication, and in all other meter work wherever possible

Publication No. C10
Published Dec., 1935
Price 10 cents

AIR CONDITIONING 1935

A Report of the Sales Committee, Factual Data on Air Conditioning Installations—Manufacturers Cooperation with Utilities

This report contains specific data on typical air conditioning installations in banks, hotels, offices, office buildings, printing plants, residences, restaurants, stores, and undertaking establishments in various sections of the country. Information on each installation as to the size and character of equipment and the purpose to be achieved is given, together with hours of operation, maximum demand, energy consumption, and other factual data.

Statements from manufacturers giving their views on the cooperation which public utilities can render in promoting the use of air conditioning equipment are included in the report.

Publication No. C7
Published September, 1935
Price 50c to members and their employees
Price $1.25 to non-members in U.S.A.

TURBINES, CONDENSERS AND FEEDWATER HEATERS 1935

A Report of the Turbine Subcommittee of the Prime Movers Committee, Edison Electric Institute

This report contains statements by Operating Companies and Manufacturers on:

Turbine Operating Experiences
Deposits on Turbine Blading
Corrosion and Erosion of Turbine Blading
Turbine Lubricating Oil
Test of 90,000 kw Turbine-Generator
Condenser Operating Experiences
Condenser Tube Materials
Chlorination of Circulating Water
Circulating, Condensate, and Boiler Feed Pumps
Feedwater Heaters and Deaeration

Publication No. C5
Published July, 1935
Price 40c to members and their employees
Price $1.00 to non-members in U.S.A.

ABLE OPERATION 1934

A Report of the Transmission and Distribution Committee, Edison Electric Institute

During 1934 the combined failure rate reported for all high voltage equipment (terminals, joint, and pothead failures per 100 miles of cable per year) was the lowest yet attained, despite the fact that the rate of pothead failure was at its highest value since 1929. The operation of joints and cables, however, has shown much improvement. During the past five years, the rate of failure for joints has decreased 51 per cent, while the rate of cable failure has had a net decrease of 26 per cent. Since the rate of inherent failure for cables has been virtually constant during this five-year period, the improvement in cable operation may be ascribed mainly to the almost steady decrease in non-inherent failures which are primarily under the control of the operating companies.

While this report begins the practice of collecting from all contributing companies data on removals of high voltage equipment in anticipation of failure. The inclusion of the anticipated failures with the service and test failures resulted in increasing the cable failure rate 36 per cent, the pothead failure rate 39 per cent, and in more than doubling the rate of joint failure.

One per cent of all the inherent failures (service, test, and anticipated) occurred on cables whose age at failure was less than the manufacturer's two-year guarantee period.

According to the ETL analysis, the most frequent cause of cable failure or removal was sheath corrosion due to external currents.

Dielectric testing of underground systems was carried on in a variety of ways. Approximately 70 per cent of the equipment covered in this report was tested by companies which maintained some sort of testing procedure, and about one out of every 15 tests produced an equipment failure.

Publication No. C11
Published December, 1935
Price 60c to members and their employees
Price $1.50 to non-members in U.S.A.

THODS OF MEASURING RADIO NOISE

A Report of the Joint Coordination Committee on Radio Reception of E.E.I., NEMA, and R.M.A.

This report contains specifications for instrument for measuring radio noise and procedure to follow in use of instrument.

Publication No. C9

Price 15¢ to members and their employees
Price 35¢ to non-members in U.S.A.

AND GAS ENGINES 1934-1935

A Report of the Oil and Gas Engine Subcommittee of the Prime Movers Committee

Diesel Engine Progress and Trends: Diesel production, new developments, new installations in U.S.A. and Canada; installations in foreign countries

Diesel Oil: tentative classification of fuel oil; testing

International Electrotechnical Commission Work

High-Speed Engines: specifications, auxiliaries; mechanical-drive units; new radial engine; fuel and lubricating oil, maintenance costs

Slow- and Medium-Speed Diesels: operating difficulties, operation and maintenance records; British experiences

Miscellaneous Cost Data: engine costs, trend of energy costs

Plant-Operating Data: covering 63 engine units; maintenance and operating factors and outages

Manufacturers' Statements

Publication No. C8
Published Oct., 1935

Price 50c to members and their employees
Price $1.25 to non-members in U.S.A.
Price $1.35 to foreign countries
Prices include mailing charges

REPORTS

Title and summaries of nine recent reports of committees of the Edison Electric Institute are shown hereon.

Copies will be forwarded at the prices quoted. Please note that member prices apply only to members of the Institute and employees of member companies. For orders destined to foreign countries, add 10 cents per report to non-member prices.

The Institute will accept standing orders for committee reports, shipment to be made when and as reports are published. This service is limited to members of the Institute, or employees of members. Standing order blanks will be supplied upon request.

Complete price list of E.E.I. publications will be mailed upon request.

STANDING ORDER FOR E. E. I. REPORTS

(For Use of Member Companies, or Member Company Employees only)

EDISON ELECTRIC INSTITUTE
420 Lexington Ave., New York, N. Y.

Date .....

This is our Standing Order, to remain in effect until rescinded by us, for E. E. I. Committee Reports as published and as specified below:

	Number of Copies Required
Accident Prevention Committee	
Electrical Equipment Committee	
Hydraulic Power Committee	
Prime Movers Committee	
Sales Committee	
Transmission and Distribution Committee	

Name of Company[1] or Individual .....

Street ..... City ..... State .....

[1] *If ordered by a company, please give the following information:*

Person authorizing order .....

Title ..... Purchase Order No. .....

Person to whom reports should be sent (for distribution within the company) .....

Invoice to be sent to .....

PLEASE

(1) Specify in the space provided after each committee, the desired number of copies of each report, as issued by the committee.

(2) Give the shipping and billing information requested.

(3) Mail filled-in form to the Edison Electric Institute, 420 Lexington Avenue, New York, N. Y.

There are no set dates for the issuance of reports, which are prepared only when a sufficient amount of new and valuable information has been gathered to justify their publication.

Price quotations are not available in advance of publication, since prices of reports are based on actual production costs. The regular member company price will apply to the reports ordered on Standing Order Form. Invoice will be mailed at the time of shipment.

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420 LEXINGTON AVE., NEW YORK, N. Y.

Binders for E.E.I. Reports Are Available at $1.25 each

J. C. Richert, Jr.

Donald Ward

R. F. Dunlap

A. J. Prejean

Ten Recent Awards of Edison Electric Institute Medals

A NUMBER of Edison Electric Institute Medals for Resuscitation by the Prone Pressure Method have been awarded to employees of member companies of the Institute since the last announcement in the February, 1935, BULLETIN. Presentation of ten of these Medals have been made, two in the states of Indiana, Massachusetts and Texas, and one each in South Carolina, Oklahoma, Oregon and Pennsylvania. Several Medals are pending presentation and others are being considered by the Judges, of whom Mr. E. W. Gorry, the New York Edison Company, Inc., is chairman.

The Edison Electric Institute Medal was established by the Board of Trustees of the Institute in 1933 as an award to employees of member companies who have successfully resuscitated individuals suffering from electric shock by the Schafer Prone Pressure Method. The award is intended to serve both as recognition of the performance of the act and to encourage and maintain interest in the training of employees in the use of the Schafer Prone Pressure Method of Resuscitation. The award was made available for successful resuscitation cases occurring on or after Jan. 12, 1933, the date of the organization of the Institute.

A certificate describing the service rendered and signed by the president of the Institute is awarded with each Medal. In cases where a Medal has been awarded, a certificate of assistance is available to those who have rendered valuable aid in the resuscitation.

In addition to their significance as well-merited tokens of humanitarian accomplishment, the Medals have a historical and sentimental value in that they have in their composition copper from the original mains laid down in New York City by the late Thomas A. Edison. This copper was part of the first underground system in the world for supplying current for electric light and power.

The names of the recipients of the Medals and brief statements of the circumstances leading to the awards follow:

EMIL MATSON
Oregon

On March 18, 1933, at 1.20 P.M., while installing cross arm on pole in the outdoor substation at the Oregon Washington Water Service Company pumping plant at Marshfield, Ore., Ernest O. Holm fell across the bus bar on the 11,000 volt side of the transformer bank. Herbert Thom, who was on the pole, saw Holm lying across the bus bar with his left hip and left forearm on the transformer. Thom attempted to free Holm, but the latter slipped down the 11 kv side of the transformer with his head in contact with same and his shoulder on the wire. Thom called to Emil Matson, who was on the ground, to open the switch. After doing this he removed Holm from the wire and immediately applied artificial respiration. After 25 or 30 minutes, Holm resumed breathing and was removed to the hospital.

The Edison Electric Institute Medal was presented to Mr. Matson, and a Certificate of Assistance to Mr. Thom, both of whom are employed by the Mountain States Power Company, on Thursday evening, Feb. 28, 1935, at a gathering of about sixty employees at Marshfield, Ore. Mr. Walter Smith, Superintendent of the Willamette Division and Safety Engineer of the Division, presented the Medal and Certificate of Assistance. Local papers published full details of the presentation ceremonies.

J. C. RICHERT, JR.
South Carolina

On the evening of May 28, 1934, a storm broke an overhead wire in the township of Marion, S. C. At the particular location, street illumination was poor owing to the heavy foliage of trees which lined the street. A student, namely E. Carr Shepard, Jr., walked into the fallen wire and received a shock which rendered him unconscious.

A resident nearby heard the injured scream, and telephoned the lighting company, who de-energized the circuit immediately. J. C. Richert, Jr., a division manager of the Carolina Power & Light Company, rushed to the scene with J. W. McPhail, another employee, arriving in about 10 minutes. The

Emil Matson, Recipient of Medal, and H. L. Thom, Recipient of Certificate of Assistance

S. N. Manning

Clyde Dean

Roy G. Topley

Ray Whitt

injured man was unconscious and not breathing. His face had become discolored. Richert started resuscitation at once, and carried on for about five minutes when the injured showed signs of life, and for about 10 minutes longer when he breathed without assistance.

He was carried to a nearby substation where he received first-aid treatment, and then removed to the hospital.

The medal was presented to Mr. Richert by his immediate superior, Mr. T. F. Drew, manager, Distribution and Service Department, at a district safety conference held in Marion, S. C., on Wednesday, June 12, 1935. The meeting was attended by seventy employees, including all district managers, superintendents and foremen in the company's South Carolina Division and representatives from several departments from the company's general office.

The principal address was delivered by A. Y. Arledge, of Company's Legal Department. News items reporting the meeting appeared in the local Marion, S. C., newspaper.

DONALD WARD

Indiana

A crew of the linemen of the Public Service Company of Indiana was engaged in making changes in overhead wires at Salem, Ind. Fred J. Rehman was assigned to splice together certain low tension wires which were presumably dead during the course of this work. In some manner one of these wires came in contact with a high tension wire farther down the street. Rehman was working on the ground and wore no gloves. When he proceeded to splice this live wire he received a shock which rendered him unconscious. Edward Chambers called to James Biesel, who was working on the ground near him, and Biesel cleared him from the circuit by moving the wire from his body with a pole. Donald Ward was working on top of a pole nearby, descended and immediately started resuscitation which he continued for about ten minutes. During this time J. T. Cockrum had descended from an adjacent pole and assisted Donald Ward by drawing the victim's tongue forward. Rehman was then taken to a local hospital for further treatment.

The medal was presented on Nov. 27, 1935, to Mr. Ward by Capt. L. D. Spragle, retired division manager, at New Albany, Ind., who represented Mr. C. D. Porter, vice-president and general manager of the company.

Citations for assistance in the life saving episode were given to J. T. Cockrum, another local lineman, to James Biesel and Edward Chambers, groundmen, who assisted Ward in the resuscitation of Fred J. Rehman.

R. F. DUNLAP

Oklahoma

George R. Meyer, employed by the Oklahoma Gas and Electric Company, was in charge of a crew of linemen engaged in the removal of concrete poles which were being replaced by wooden poles.

In the course of this work one of the poles accidentally fell across a live overhead wire, pulling it down to the ground. In an attempt to clear the wire from ground, George R. Meyer raised the fallen pole using a crossarm as a pry, while two linemen, using rope slings attempted to pull the wire from underneath. The wire came in contact with Meyer's left wrist, rendering him unconscious and he fell prone upon the live wire.

Two linemen, George Gray and Sam Schroeder, who held the rope slings, pulled the wire from under the injured man, and R. F. Dunlap started resuscitation. He continued for about four minutes when the injured showed signs of life, and for about fifteen minutes more when he breathed without assistance.

He was removed to a local hospital for further treatment.

The medal was presented to Mr. R. F. Dunlap by Mr. J. F. Owens, president of the Oklahoma Gas and Electric Company, on July 11, 1935, at the company's annual picnic at Belle Island Park, Oklahoma City. A half holiday was declared for company employees and more than 2000 members of company families from Oklahoma City, Guthrie, Norman and El Reno attended.

A. J. PREJEAN

Texas

Two troublemen, A. J. Prejean and W. H. Stoever, employees of the Gulf States Utilities Company, were engaged in painting the front of a building in Port Arthur, Tex. Adjacent to this building was a pole which supported various overhead wires and transformers.

After the painting was completed, the men proceeded to remove paint spots from the metal trim. Stoever stood upon the transformer platform of the pole, and with his safety belt in place, leaned out to do his work. His back came in contact with a wire charged with approximately 4000 volts, and he received a shock which rendered him unconscious. Prejean, who was working below, rushed to the injured man's assistance, and with the help of two telephone company employees, who were working nearby, lowered Stoever to the ground. He immediately started the application of artificial respiration. In about five minutes the injured man breathed without assistance, and he was removed to a local hospital for treatment of his burns.

At a general meeting of employees in the Port Arthur, Tex., Division, the medal was presented to Mr. Prejean by Mr. C. F. Terrell, vice-president of the company, on Sept. 24, 1935, at seven o'clock. There were approximately one hundred employees present at this gathering.

S. N. MANNING

Massachusetts

Employees of the town of Barre, Mass., were engaged in the work of painting out moths on trees. In connection with this work, at a location in front of 102 Vernon Avenue, South Barre, Mass., one Edgar E. Dahart was astride a crotch in a tree, in such a position that his feet were close to a telephone cable, and his head in close proximity of a power line. His safety belt was fastened about the tree, and a rope trailed to the ground, and was held by another employee.

In some manner, Dahart came in contact with the power line and the telephone cable, so that the current passed through his body from the back of his neck to his both ankles, causing him to become unconscious and his respiration to cease.

The man below jerked the rope clearing the injured man from contact, and with the help of the tree-warden, who was nearby, lowered the unconscious man to the ground.

Meanwhile a call was made for aid, and two employees of the Gardner Electric Light Company arrived. S. N. Manning, a line foreman, immediately started resuscitation and was relieved periodically by H. D. Schofield, a lineman. In about ten minutes the injured showed signs of life, and thirty minutes later breathed without assistance. He was given first-aid treatment on the scene by a local physician, and removed to a hospital for further attention. Manning and Schofield accompanied the patient in order to resume artificial respiration if necessary.

The medal was presented to Mr. Manning and a Certificate of Assistance was presented to Mr. Schofield on Sept. 25, 1935, at the Castle Club, Gardner, Mass., by Mr. J. P.

McCann, safety manager of the New England Power Association.

CLYDE DEAN
Texas

On March 5, 1935, A. R. Smith, section foreman for the Texas Pacific Railway Company, and several Mexican laborers were on the roof of the Forney Depot spreading a tarpaulin over the damaged tile to prevent water leaking through until the roof could be repaired. Manuel Coronado, one of the laborers, had to pass under the 550-volt signal wires which were only a few feet above the roof. As he passed under them he slipped and in attempting to keep from falling, he grabbed two of the wires, one in each hand, and immediately received an electric shock which rendered him unconscious. As soon as the foreman discovered Coronado was hung on the wires he had another laborer pull him off by catching hold of his clothing. When Coronado was clear of the wires the railway agent called a local doctor and sent someone to locate the Texas Power and Light Company employees who were working in Forney. The messenger found Clyde Dean and when he heard what had happened, Dean climbed to the roof and started applying the prone pressure method of resuscitation. After a few minutes' application Coronado began to show signs of life and breathed sufficiently to be lowered to the ground, where Dean resumed application of the prone pressure method until Coronado was breathing normally. (Elapsed time about fifteen minutes.) He was then removed to the Forney Sanitarium for treatment of severe burns on both hands. At least five minutes had elapsed from the time of the accident until Dean arrived at the scene and started resuscitation.

The Edison Electric Institute Medal was presented to Mr. Dean on Nov. 21, 1935, in a public meeting held in the Municipal Auditorium in Terrell, Tex. There were approximately four hundred present, about fifty of whom were the company's employees, and the others citizens from Terrell and surrounding communities, together with about twenty representatives from the Texas Pacific Railway, by whom the resuscitated man was employed. The presentation was made by Mr. C. J. Rutland, safety engineer of the Texas Power and Light Company.

CHELSEA LINE CREW
Massachusetts

A line crew of the Edison Electric Illuminating Company of Boston was engaged in the transfer of overhead wires from an old pole to a new one recently erected on William Street, Chelsea, Mass.

Anthony H. Schumann was one of three men working aloft. In the course of his work, his body came in contact with one of these wires, while his left thigh rested against a transformer which was mounted on a pole.

His two associates, Lewis and William LeVangia, cleared him from contact, and with the aid of Earl J. Brady, another lineman, lowered the injured to the ground. Brady immediately applied the Schafer Method of Resuscitation and after a time was relieved by William LeVangia who had since descended the pole. LeVangia continued resuscitation until the injured breathed without assistance.

Schumann was then removed to a local hospital for further treatment and was accompanied by Lewis and William LeVangia, who are respectively father and son.

Noteworthy assistance was rendered by Foreman Alexander McNeill and Charles J. O'Brien.

The award was made Dec. 4, 1935, by Mr. Leavitt L. Edgar, vice-president and head of Operating and Commercial Departments, to Alex McNeill, foreman of the crew. Each member of the crew was in turn presented with a framed reproduction of the certificate.

In recognition of the meritorious service, the crew and guests were given a dinner at the Parker House Hotel the same evening, in attendance with officials of the Distribution Department and Personnel Bureau of the company.

ROY G. TOPLEY
Pennsylvania

On July 8, 1935, a line crew of the Duquesne Light Company was engaged in the inspection and cleaning of disconnecting potheads on a pole in Rankin, Pa.

Frank A. Miller, a lineman, had started this work when his spurs slipped from the pole, and he fell against the pothead which he was inspecting.

Another lineman, Roy Topley, who was also working on this pole, cleared the injured from contact, and immediately applied a modified form of the Schafer Method of Resuscitation to the victim while on the pole. When he breathed without assistance he was lowered to the ground, and given further resuscitation and first-aid treatment pending his recovery to consciousness. He was then removed to a local hospital for further treatment.

The medal was presented to Mr. Topley on Nov. 19, 1935, by Mr. E. W. Judy, vice-president and general manager of the Duquesne Light Company, together with a cash award from the company in the amount of $50. The local papers carried news articles describing the occurrence, as well as information pertaining to the presentation.

RAY WHITT
Indiana

On Aug. 29, 1935, a line crew of the Public Service Company of Indiana had removed a pole supporting an 11,000-volt transmission line, at a location between Markleville and Middletown, Ind.

In preparing their truck for transit, it was necessary for the crew to collapse the "stiff-leg," or metal boom, which had been used in lowering the pole to the ground. In doing so, the boom struck one of the transmission wires, causing the truck chassis and its hardware to become charged with electricity. Jasper Pruitt was handling the boom rigging and received a shock which caused him to become unconscious. Ray Whitt, who was touching the metal body of the truck, also received a shock which threw him to the ground, but he immediately arose and went to Pruitt's assistance, and applied resuscitation, which he continued for about ten minutes when Pruitt recovered his senses. Conspicuous assistance was rendered by Bert Vanhoos, the foreman of the crew, and Joseph Stratton. The injured was removed to a hospital at New Castle for treatment of his burns.

The medal was presented to Mr. Whitt of New Castle, Ind., on Dec. 5, 1935, by Mr. C. D. Porter, vice-president and general manager of the company, who also presented certificates of assistance to Bert Vanhoos and Joseph Stratton. There were about 110 persons present, most of whom were employed by the company.

Line crew (Chelsea) of Edison Electric Illuminating Company of Boston, and company officials at presentation of medal. Left to right: Messrs. L. LeVangia, Keddy, W. LeVangia, Anthony H. Schumann, Charles J. O'Brien, Earl J. Brady, Alexander McNeill, G. McNeill and L. L. Edgar

Analysis and Forecast of Residential Sales and the Effect of Adjusting for Billing Periods

By Henry G. Knaf
Brooklyn Edison Co., Inc.

ELECTRIC power companies are devoting increasing effort to the statistical analysis of their sales in order to improve the prediction of revenue from energy sales. Therefore, a contribution like the Byllesby prize paper by S. J. Helfman, "A Guide to the Industry in the Statistical Analysis of Reported Residential Sales,"[1] holds particular interest. In it the fact is brought out that the residential sales reported for any month are in reality only half consumed in that month, whereas the other half is consumed in the previous month, due to the reading of the meters being spread over thirty days. This in itself, however, would be of little concern—since it happens every year the same way—were it not that the meter reading schedules change from year to year because of the varying number and location of non-meter reading days within the billing periods. Thus, the reported sales for any one month may show an increase compared to the same month a year ago, whereas in reality they have not increased at all, when the change in the meter reading schedule has been discounted. Mr. Helfman has devised an ingenious method to correct the reported monthly sales for these changes, making it possible to improve the forecast of residential sales.

In this article a statistical analysis and forecast of residential sales will be outlined with emphasis on this effect. Describing the effect of the correction by expressing the weighted average billing periods (Table I) in terms of per cent change of any month from the same month of the previous year will exaggerate it. For instance, going from March, 1928, to March, 1929, the per cent change becomes 3.9, whereas when using the per cent deviations from the average of the eight March months, March, 1928, becomes 2.1 per cent and March, 1929, only 1.6 per cent. To get a measure of the overall effect of the correction the so-called standard deviation[2] of all Januaries, Februaries, etc.,

MR. KNAF

from their respective eight-year averages was formed. It amounted to .9 per cent. However, it will be demonstrated that the actual improvement over the course of eight years is even more moderate, when the available data are analyzed in more detail.

The Four Elements of Economic Data

Economic data in general can be said to contain four elements, namely, long term trend, cycle, seasonal variation and random or residual movement. They are defined as follows:

Long-term trend (T) is the secular or long-term growth within the available data. It is usually expressed in the form of a mathematical curve or a moving average.

Cycle (C) is the swing from prosperity through recession, depression, recovery and back again to prosperity. It revolves around the long-term trend and is expressed as a relative of it.

Seasonal variation (S) is the more or less regular movement within the twelve-month period. It is recurring and is caused by the change of the seasons. Quite often it changes its form and intensity in the course of time. It is expressed as a relative of the trend-cycle movement ($T \times C$). Any set of seasonal relatives should average 100 per cent, since it is of the nature of seasonal variation to involve no net change for the year as a whole but only disturbances of the level of the year.

Random or residual movement (R) are the irregular and accidental variations caused mainly by weather conditions and changing number of Sundays per month in different years.

The relationship of these four elements is expressed mathematically as follows: Actual values (A) = $T \times C \times S \times R$, where the last three terms

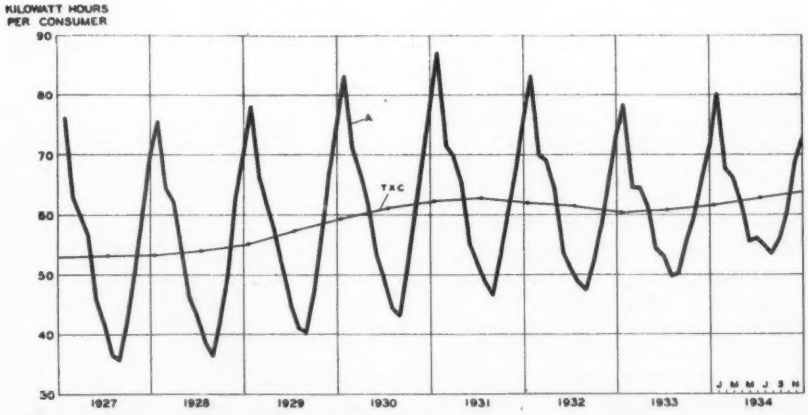

Fig. 1—Through the reported monthly sales per industrial consumer (A) the trend cycle movement (T × C) is drawn. It consists of two of the twelve-month moving averages per year, one coinciding with the calendar year, the other shifted six months from it, which are connected by straight lines.

[1] Published in September 1935, EDISON ELECTRIC INSTITUTE BULLETIN.

[2] The standard deviation is expressed as follows $\sigma = \sqrt{\frac{\Sigma d^2}{n}}$ where d are the deviations from the arithmetic average and n the number of cases.

are in per cent form, whereas T is in actual values.

The Separation of the Four Elements

The separation of these four elements is one of the major tasks of quantitative statistics and a multiplicity of methods is available to accomplish it.[3] Due to its simplicity and clarity of conception the so-called ratio-to-moving-average method[4] is used here with a slight modification. This method, a step by step description of which will follow, is applied to two sets of data, both obtained from Mr. Helfman's paper, first to the average monthly residential sales per consumer of the Duquesne Light Company from 1928 through 1934, second to the average daily sales per consumer which were arrived at by dividing the monthly sales per consumer by the corresponding weighted average billing periods (Table I). The two sets of data are used to be able to compare the effect of correction for billing periods.

The first step to separate the four elements is usually to determine the long-term trend. However, the data do not cover a long enough period for that. But since we are concerned here only with the requirements of a short-term forecast of monthly values, say, twelve months ahead, the establishment of the long-term trend can be omitted and the combined trend-cycle movement (T×C) can be used.

The ratio to moving average method considers the twelve-month moving-average of the actual data (A) to be identical with the trend-cycle movement. Instead of using, however, all the twelve-month averages only two are used here per year, namely, the one for the calendar year, usually called the monthly average, and another one displaced from the first by six months. These semi-annual points are connected by straight lines and the curve so obtained is considered the T × C movement. This simplification saves considerable time without causing any appreciable error. The trend-cycle curve has to be extended for half a year at the beginning and at the end of the data by extrapolating the straight lines connecting the last two known points in each case. (Fig. 1.)

Then the ratios of the actual values to the corresponding points on the trend-cycle curve are formed. By dividing A by T × C the seasonal variation with the random movement (S × R) is isolated. But before plotting the ratios they are adjusted by proration so that the average for each calendar year becomes 100. The maximum adjustment necessary is found to be .7 per cent, which justifies the use of the semi-annual twelve-month moving average as the trend-cycle movement and the basis for the seasonal variation. The adjusted ratios are plotted on Fig. 2 with the T × C movement as the 100 per cent line. Next we must isolate the random variations which cause the irregular appearance of the ratios (A ÷ T × C) when the points for all Januaries, Februaries, etc., are connected through the eight years. This is made possible by putting rectilinear trends through the eight ratios for each month by the least square method. On these trends are located the monthly ordinates of the seasonal variation (S). They are often called the "normal" or "typical" seasonal variation in contrast to the "actual" seasonal variation (S × R) which still contains the random movement. A checkup will reveal that these typical seasonal variations add up very closely to 1200 for each year, in other words, their monthly average is practically 100. Therefore no adjustment is necessary.

As a final step the normal seasonal variation and the random movement are separated by dividing the actual seasonal ratios (S × R) for each month of the eight years by the corresponding normal seasonal ratios (S). The random movement thus obtained as a relative of the normal seasonal is plotted on Fig. 3 for the reported monthly sales per consumer

TABLE I—WEIGHTED AVERAGE BILLING PERIODS APPLICABLE TO REPORTED MONTHLY RESIDENTIAL SALES

	1927	1928	1929	1930	1931	1932	1933	1934
Jan.	31.87	31.91	31.86	31.81	32.39	31.82	31.91	32.02
Feb.	28.23	28.87	28.85	28.87	28.84	28.84	28.24	29.00
Mar.	30.10	30.60	29.46	29.48	29.54	30.64	30.07	29.73
Apr.	30.38	30.38	30.38	30.35	30.31	30.88	30.33	30.19
May	29.83	29.78	30.35	30.34	29.74	29.83	29.83	30.12
June	30.86	31.43	30.86	30.91	30.95	30.86	31.42	31.40
July	30.78	30.87	30.83	30.78	31.35	30.78	30.83	30.76
Aug.	30.50	30.39	30.99	30.43	30.46	30.50	30.45	30.83
Sept.	31.30	30.85	30.95	30.95	30.68	31.30	31.35	30.81
Oct.	29.92	29.86	29.76	30.32	30.54	29.92	29.91	29.49
Nov.	30.00	30.34	30.39	29.85	29.95	30.00	29.73	30.78
Dec.	30.85	30.52	30.52	30.50	30.41	30.85	30.52	30.37

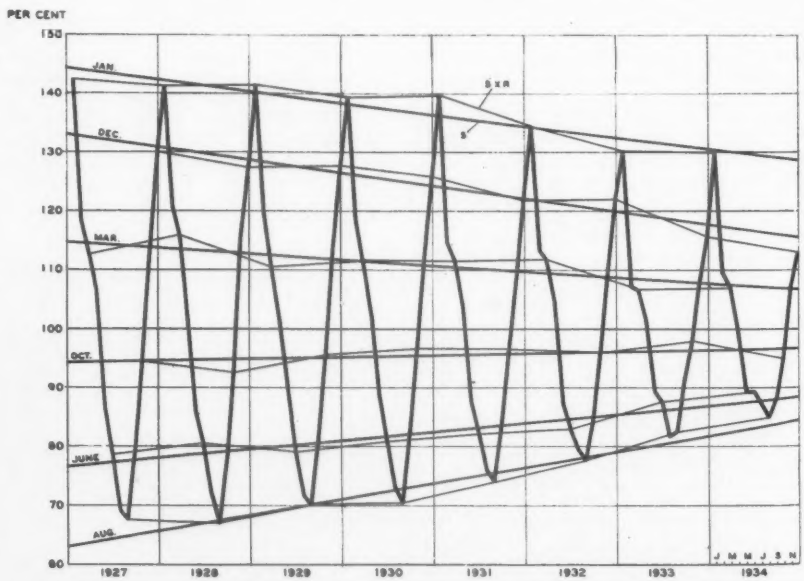

Fig. 2—The ratios of the actual values (A) to the trend-cycle movement (T × C) are formed and adjusted so that their average is 100 for each year. Those ratios (S × R) are called the actual seasonal variations. Rectilinear trends are put through them to eliminate the random (R) and to obtain the normal seasonal variations (S). To prevent crowding only six months are shown.

[3] See W. C. Mitchell "Business Cycles."
[4] A. Joy and W. Thomas "The Use of Moving Averages in the Measurement of Seasonal Variation"—Journal of the American Statistical Association—1928.

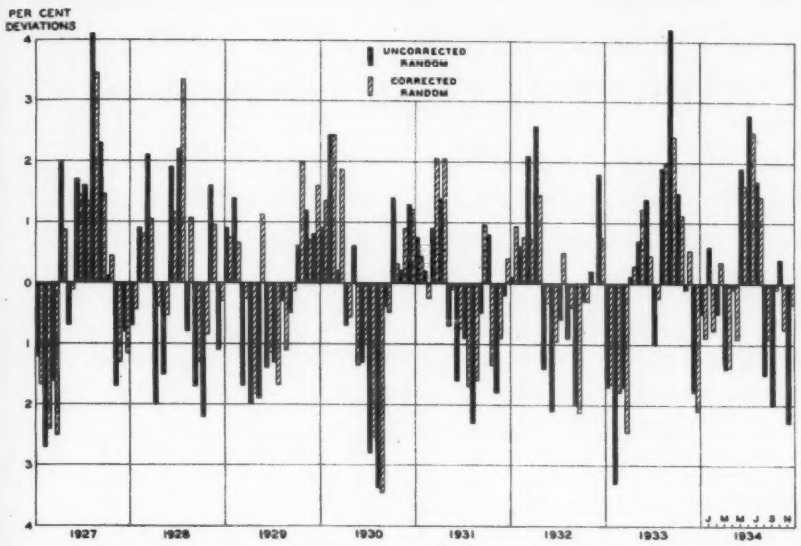

Fig. 3—The isolated random movement (R) obtained by dividing S × R by S is plotted each month for the monthly sales per consumer (uncorrected) and for the daily sales per consumer (corrected) for comparison.

as well as for the average daily sales which are the former, corrected for billing periods.

Outline of a Twelve-Month Forecast

Before discussing the problem of the random movement itself and the effect of the adjustment for monthly billing periods on it, the aspects of a twelve-month forecast shall be discussed briefly and in general terms. In this connection the advantage of a separation of the elements, as carried out above, can be shown. When the seasonal variation is found to change as in this case, a separate forecast of this change becomes indispensable. Clearly such a forecast cannot be made with the data left in their "raw" form where the cycle and the random variations obscure the change of the seasonal variation. Therefore, the latter has to be isolated. This change in the residential seasonal variation has been proceeding at a rapid pace for about ten years. The shrinkage of its amplitude amounts to ten per cent per year. Consequently, this shrinkage must play a major part in a forecast. The cause of the shrinkage is the increase of the refrigerator and range load, both appliances having seasonal characteristics such that they tend to diminish the V of the base lighting load.

A forecast of the seasonal variation is effected by extending each of the twelve monthly rectilinear trends one year ahead (Fig. 2). Quite often free-hand trends are used, based on moving averages or curvilinear trends of higher mathematical order are applied. This must be left to the judgment or taste of the individual operator. It will not alter the fundamental fact of seasonal shrinkage as long as this shrinkage is described by "trends" and as long as by trends are meant smooth curves that do not change their shape in a sudden or erratic manner. A forecast must essentially be confined to the extension of past trends, acknowledging thereby as unpredictable the irregular random movement through which the trends are laid unless, as in this case by correcting for billing periods, part of it can be rationalized. Also it cannot be assumed that the rectilinear trends used here will continue indefinitely. Rather a flattening out must be expected as refrigerator and range saturation reaches higher values. But in a short-term forecast of monthly values this is of no importance. Rectilinear trends were chosen here because their determination by the least square method is not very involved, while they still have the advantage of being mathematically definite. Thus the aim is achieved of excluding all personal judgment throughout the course of the anal-

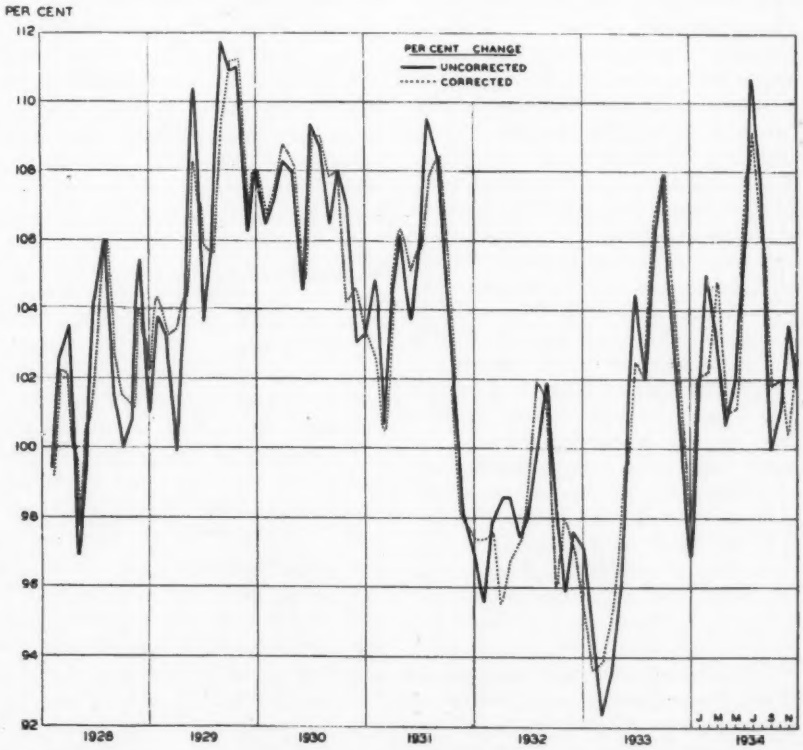

Fig. 4—The per cent changes of all months from the same month of the year before are plotted here for the uncorrected data as well as for the corrected ones. This exaggerates the random movement and demonstrates the small improvement resulting from an adjustment of reported monthly sales for billing periods. The per cent change has no value in a forecast due to this exaggeration of the random movement.

E.E.I. CONVENTION TO BE HELD AT ST. LOUIS, JUNE 1-4

The Fourth Annual Convention of the Edison Electric Institute will be held at St. Louis, Mo., June 1-4, 1936. The date and place were decided by the Operating Committee at its meeting in New York on February 11th and has been confirmed by the Board of Trustees. Details of the convention will be published in later issues.

In addition to discussing the program and other matters in connection with the convention, the Operating Committee acted on current business of the Institute and heard reports of committee activities from the several committee chairmen present.

ysis, giving every one following the calculations the same answer.

After the prediction of the normal seasonal variation we can turn to the trend-cycle movement. Here a graphic method of prediction by extrapolation of the movement through the past is not considered sufficient and an analytical approach is recommended. By that is meant that an analysis of the average residential sales per consumer for the last year, called the monthly average, should be made, breaking that figure down by appliances, by means of appliance-saturation and appliance-use. Some of the saturation figures for the more important appliances are usually known by surveys made by the company or by census conducted by other agencies, for instance, the city government. This is invariably the case with ranges and water heaters where an accurate account is kept by the company of every installation, and of refrigerators where the dealer sales in the company's territory are obtainable. In the latter case the problem of replacement sales, however, must be given careful attention. For these three heavy-duty appliances separate predictions of the increase in their saturation can be made, giving consideration to the possible effects of sales campaigns planned for the coming year. When these three major appliances are subtracted from the total residential use for the past five years the fact will become apparent that lighting and the other appliances have not increased appreciably during that time.[5] Past performance will permit the estimate of a monthly average for this only slowly changing portion of the residential energy. A combination of this value with the predictions of the heavy-duty appliances, providing the bulk of the increase, will give the forecast of the monthly average for the coming year. It is plotted at the middle of the year and through it the trend-cycle movement is extrapolated to the end of the year. Finally a synthesis of seasonal variations and the T × C movement is effected by multiplying the two together, producing thus the actual forecast values for twelve months.

[5] Compare W. M. Carpenter in "Domestic Electric Service in 1934" E. E. I. BULLETIN, April, 1935.

The Improvement of the Random Movement by the Adjustment for Billing Periods

At this point we return to the effect of the adjustment for billing periods. The actual data in their uncorrected and corrected form hardly permit a judgment. When they are represented in the form of per cent change of every month from the same month of the previous year—a form which is quite often used, even though it has no value for forecasting purposes—some idea of the effect of the adjustment can be obtained. This representation of economic data eliminates to some extent the seasonal variation, but at the same time it magnifies the cycle and particularly the random movement. For this reason the uncorrected and corrected data are shown in the per cent change form (Fig. 4) which indicates a rather slight improvement due to the adjustment for billing periods.

The isolation of the random movements as outlined before, however, permits a better appraisal of the effect of the correction. The two random movements, as shown on Fig. 3, may briefly be called the uncorrected and the corrected randoms. When the standard deviation is used, 1.66 per cent results for the uncorrected and 1.39 per cent for the corrected random. The net effect, then, of the correction during eight years amounts to .27 per cent. Inspection of Fig. 3 will furnish the explanation for this. In about 40 per cent of the cases, instead of decreasing the random, the adjustment for billing periods increases it. The erraticness of that part of the random which is not due to billing periods—we may call it the weather random—prevents a full utilization of the improvement. This fact is not changed by using trends through the actual seasonal ratios (S × R) having a better fit than rectilinear ones, like free-hand trends through 3-year moving averages. This may diminish the weather random to some extent, but it will not increase the improvement any, as determined by tests.

In general it can be said that a prediction of monthly residential sales is easier than for other types of consumers mainly due to the great number of people involved, but a prediction that stays inside of a three per cent deviation from the actual values will be found extremely difficult. It is, therefore, well to realize that the improvement gained through adjustment for billing periods is only limited and can by no means play a major part in a forecast, even though it constitutes a definite improvement.

The Telephone Influence Factor of Supply System Voltages and Currents

IN STUDIES of the inductive coordination of power and telephone systems from the noise standpoint, it is desirable that there be available a means of evaluating or rating the wave shape of supply system voltages and currents in terms of their inductive influence on exposed telephone circuits. A factor for this purpose, called the "Telephone Interference Factor," was described before the A.I.E.E. in 1919, in a paper[1] by H. S. Osborne. This factor gave an indication of the total harmonic content of a voltage wave, the individual components present being weighted in proportion to their relative importance in contributing to noise on exposed telephone lines. The Telephone Interference Factor was expressed in terms of the ratio of the square root of the sum of the squares of the weighted values of all the sine-wave components (including in a-c waves both fundamental and harmonics) to the r.m.s. value of the wave. Since 1919, this method of appraising wave shape has been used extensively in the field of inductive coordination, and Telephone Interference Factor, usually contracted to T.I.F., has been found a useful quantity both in rating the wave form of electrical machinery and in evaluating the inductive influence of power systems.

The frequency weighting curve of the original T.I.F. meter was based upon data obtained during the period from 1914 to 1918 on the relative interfering effects of single frequencies. These data were limited to the frequency range from 200 to 1500 cycles. Since that time, more extensive tests of the same general character have been carried on in which the characteristics of more recently developed telephone instruments have been studied and in which the frequency range covered has been considerably extended. The results of this more recent work were summarized in Engineering Report No. 32, subject—"Relative Interfering Effects of Different Single-Frequency Noises in Telephone Circuits." These data on relative interfering effects of single frequencies were used as the basis of a study of methods of evaluating the inductive influence of power system voltages and currents. This work[2] has resulted in a revision and extension of the range of the T.I.F. weighting characteristic with, however, no change in the basic significance of T.I.F. It is anticipated that the revised T.I.F. will be applied to power system currents as well as voltages, the current T.I.F. being expressed in terms of weighted microamperes per r.m.s. ampere. In connection with this revision, the term "Telephone Interference Factor" has been replaced by "Telephone Influence Factor," as it is thought that the latter term more accurately designates the function of the quantity in question. It will be noted that the contraction T.I.F. remains unchanged.

The Telephone Influence Factor (T.I.F.) of a voltage or current wave is the ratio of the square root of the sum of the squares of the weighted r.m.s. values of all the sine wave components (including in alternating waves both fundamental and harmonics) to the r.m.s. value of the wave. The weightings to be applied to the individual components are given in Fig. 1. The T.I.F. of a power system current or voltage in an inductive exposure is an index to the influence of that particular current or voltage on the noise-frequency induction in the exposed telephone circuits.

The frequency weighting used in determining T.I.F. is derived from the relative interfering effects of different single frequencies in a telephone receiver, the frequency characteristic of the transmission path between the toll or trunk circuit terminals and the receiver of the telephone subscriber's set, and the variation with frequency of the inductive coupling between the power and the telephone circuits. It will be noted that the above include all the factors relating the voltage and current on the power system to the noise in the receiver of a telephone subscriber set connected to an exposed telephone circuit, with the exception of the telephone circuit unbalances. In the large majority of cases involving open-wire telephone toll circuits or open-wire telephone subscriber circuits employing bridged ringers, experience has shown that such telephone circuit unbalances as contribute appreciably to the noise are approximately independent of frequency. However, there are certain types of unbalances which are not independent of frequency as, for example, is the case with certain types of apparatus used in

TIF of Various Single Frequencies

Frequency	TIF	Frequency	TIF	Frequency	TIF
60....	1	900....	7,270	1,740....	3,660
180....	15	1,020....	11,600	1,800....	3,580
300....	205	1,080....	11,980	1,860....	3,570
360....	370	1,140....	11,100	1,980....	3,500
420....	590	1,260....	7,920	2,100....	3,500
540....	1,250	1,380....	5,470	2,500....	3,680
660....	2,250	1,440....	4,740	3,000....	3,940
720....	2,990	1,500....	4,400	5,000....	480
780....	4,080	1,620....	3,900	1,070.... (Peak)	12,000

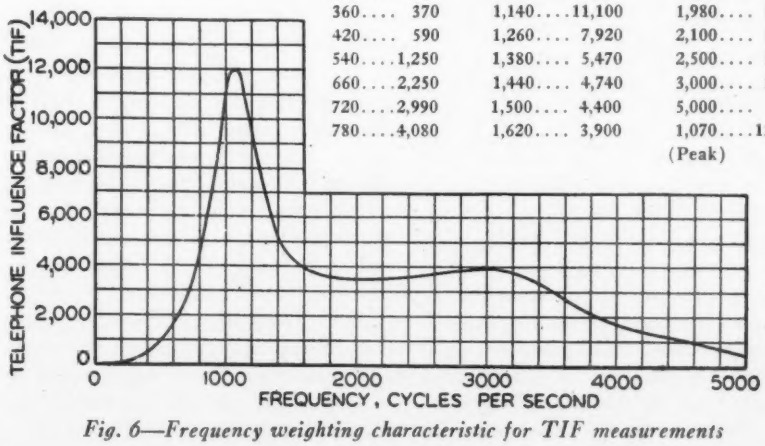

Fig. 6—Frequency weighting characteristic for TIF measurements

[1] "Review of Work of the Subcommittee on Wave Shape Standard of the Standards Committee" by H. S. Osborne—A.I.E.E. Transactions. Vol. 38, Part 1, Page 261.

[2] Engineering Report No. 33 of the Joint Subcommittee on Development and Research, available to members at 40c per copy; to non-members at $1.00 per copy.

the exchange plant. In these cases, therefore, the T.I.F. may not be a reliable index to the noise induction.

Methods of estimating noise in exposed telephone circuits have been described in Engineering Reports Nos. 9, 13, 16 and 17. In each of the above reports, the formulae given include factors representing supply system influence as well as factors representing the susceptiveness of the telephone system and the magnitude of coupling between the two classes of circuits. The total inductive influence of a particular power system voltage or current required in estimating noise is a function of its r.m.s. magnitude as well as its T.I.F. This is evident from the definition of T.I.F. as a ratio of the weighted harmonic content of a given voltage or current wave to the r.m.s. value rather than in volts or amperes. It is the usual practice to express the influence of a current in terms of the product of its magnitude in amperes times its T.I.F., this quantity being represented by the abbreviation I.T. Similarly, the influence of a voltage is frequently expressed as the product of its magnitude in kilovolts times its T.I.F., this quantity being represented by the abbreviation Kv.T.

The overall influence of a given power circuit is determined by the T.I.F.'s and r.m.s. magnitudes of both its balanced and residual currents and voltages. The I.T. and Kv.T. products discussed above are particularly useful in studying the influence of residual currents and voltages. These components are frequently so small compared to the balanced components that it is difficult to measure their r.m.s. magnitudes. However, since they may consist largely of harmonics, they are usually important from the coordination standpoint. Although it is generally not practicable to measure the r.m.s. values of residual components, the sensitivity at the harmonic frequencies of instruments for measuring T.I.F. makes it possible to measure the weighted harmonic content, from which the Kv.T. or I.T. products can be obtained.

The preceding discussion of the significance of T.I.F. has pointed out that it involves a relation between the currents or voltages in an exposed section of power line and the noise in the receiver of the telephone subscriber's set. A similar direct relationship does not exist in the case of the open circuit voltage T.I.F. of machines. This is because the wave shape of machines when connected to a power system differs from that on open circuit, as the result of the flow of harmonic currents. Furthermore, as a result of the harmonic frequency transmission characteristics of power circuits, the T.I.F. at a point on a power system remote from the exposure location may be considerably different from the T.I.F. in the exposure. Despite these limitations, the open-circuit voltage T.I.F. has been very useful as an approximate index of the influence of machines on the coordination problem. In addition to the phase-to-neutral or phase-to-phase open-circuit voltage T.I.F., use is also commonly made of the residual component of the phase - to - neutral open - circuit voltage T.I.F. of three phase machines as an index to their influence when directly connected to a power system and operating with grounded neutral. This quantity, termed "Residual Component T.I.F.," is the ratio of the square root of the sum of the squares of the weighted residual harmonic voltages to three times the r.m.s. phase-to-neutral voltage. Attention is called to the difference between the Residual Component T.I.F. of machines and the T.I.F. of a power system residual voltage. The latter quantity is the ratio of the square root of the sum of the squares of the weighted residual harmonic voltages to the r.m.s. residual voltage.

Since T.I.F. is the ratio of the square root of the sum of the squares of the weighted components in a current or voltage wave to the r.m.s. value of the wave, its value can readily be calculated if the various component frequencies in the wave are known. The procedure consists in (1) multiplying each component frequency by the corresponding weighting factor shown in Fig. 1, (2) squaring each of these products, (3) obtaining the sum of these squares, (4) extracting the square root of this sum, and (5) dividing by the r.m.s. value of the current or voltage wave in question. The quantity obtained in step (4) of this process gives the I.T. or Kv.T. product.

The following example illustrates this process as applied to a current wave:

Frequency Cycles	Frequency Composition Amperes	Weighting Factor (Fig. 1)	Product of (b) x (c)	Squares of (d)
(a)	(b)	(c)	(d)	(e)
60	11.	1	11	121
180	.6	15	9	81
300	.3	205	62	3,840
540	.02	1,250	25	625
900	.04	7,270	291	84,700
1,500	.02	4,400	88	7,740
1,620	.015	3,900	59	3,480
				100,587

The square root of 100,600 gives 317 as the I.T. product. Dividing by the r.m.s. value of the current gives 28.8 for the T.I.F.

New York Safety Conference

The seventh annual Greater New York Safety Conference will be held at the Astor Hotel, March 3, 4 and 5, 1936. Thirty-three complete half-day sessions will cover the entire field of accident prevention — in industry, on the streets and highways, in the home and in the air. An attendance of not less than 6000 is anticipated.

All sessions are open to the public, without any cost whatsoever. Programs and registration blanks will be sent on request to the conference headquarters, 9 East 41st Street, New York City.

Midwest Power Engineering Conference

The Midwest Power Engineering Conference will hold its annual meeting, April 20-24, in Chicago. The conference will consist of 12 sessions with about 35 papers.

Several sessions will be specialized, some being technical ones and others will be general sessions. At one of the general sessions it is proposed to cover a program on the topic of "Public Policy in Reference to Power Generation, Distribution and Utilization in the United States."

Accident Prevention Committee Meeting

W. A. Buchanan, Chairman

THE fourth meeting of the Accident Prevention Committee was held at the general office of the Edison Electric Institute in New York on Jan. 31 and Feb. 1. Nine of the fourteen members of the Committee were present. Several guests attended.

Following a discussion of routine matters, Mr. Beardsley reported on accident statistics. He said arrangements had been made whereby statistics would be made available by states for committee use. In recent years the trend curves of accidents have been "flattening out" and it now appears that methods which have not heretofore been employed must be utilized to bring about still further improvement in the accident and severity rate among utility employees. It is thought that this can be accomplished through a study and analysis of the causes of accidents.

Mr. Beardsley has been given the assignment of collecting accident statistics on a Cause and Locus basis. When sufficient data have been received and analyzed, it is expected that the various groups within the industry can be advised of the number of accidents within their respective fields of activity and the outstanding causes which contribute to such accidents. It is realized that this is a large and difficult undertaking and that two or three years may be required to produce sufficient information for use by other committees.

The home educational safety drive that is being conducted by the Red Cross was discussed by Chairman Buchanan. He said that arrangements had been made whereby material may be placed in the next publication issued by the Red Cross for this purpose, calling attention to the conditions that should be avoided in the home to prevent electric shock.

Dr. Wittmer made a report for the Health Subcommittee. He described at considerable length the various activities which this subcommittee has undertaken. Particular mention was made of the Holger Nielsen Method of resuscitation and it was compared with the Schaefer Prone Pressure Method which has been standard within the industry for many years. A word of caution was given to avoid hasty action in adopting this new method of resuscitation until all phases of the subject have been carefully investigated.

Mr. Gross reported on the progress of the preparation of the grounding report. He said he expected to have a copy of the section on Temporary Safety Grounding for study by the committee in the near future.

Mr. Buchanan called attention to the need for study of that part of the grounding report which deals with grounding on consumers' premises. This is related to certain phases of safety and accident prevention. As soon as this part of the report is available it will be distributed to the Accident Prevention Committee for study and comment.

Mr. Burton's report on Public Safety consisted mainly of a progress report on the electrified fence situation. He said that this subject is being brought to the attention of companies interested and that in some locations farmers continue to install this equipment. He referred to the article that had appeared in the July, 1935, E.E.I. BULLETIN in which the use of electricity for this purpose was strongly condemned. The question of legal responsibility involved was discussed briefly. Mr. Burton also referred to correspondence he has had with a veterinarian concerning the possible effects of light shocks on thoroughbred live stock.

Mr. Smith reported at considerable length on the efforts he has made to bring about cooperative work between the American Society of Safety Engineers and other organizations interested in safety. He said that this work is going forward satisfactorily and that he expects within the next few months to have a definite program outlined whereby effective cooperative work along safety and accident prevention lines will be established.

Mr. Beardsley presented a report which contained a bibliography of articles on accident prevention and safety which had been prepared under his direction. He said that in the preparation of this bibliography an effort had been made to eliminate references to obsolete material and, so far as possible, to avoid unnecessary duplicate references. The purpose of this report is to make available to all those interested, a thorough and comprehensive list of accident prevention and safety literature. Members of the committee were asked to review and study the report which Mr. Beardsley presented and be in a position to discuss it at the next meeting of the Committee.

Mr. Gorry reported briefly on low voltage accidents. He stated that very little information on low voltage accidents had come to his attention since the Louisville meeting. It was pointed out that experience has indicated that low voltage accidents greatly decrease in number following the summer months and that probably the lack of information was an indication that very few cases had occurred in recent months.

Mr. Gorry also reported on the revision of the publication, "Common Sense and Electricity," a small pamphlet prepared and published several years ago by the Accident Prevention Committee of the former N.E.L.A. He presented a revised draft of this pamphlet and distributed it to the Committee for comment, requesting that prompt study be made of it and suggestions forwarded to him as quickly as possible in order that the pamphlet may be made available for member companies to distribute in their territory in the near future. There was considerable discussion concerning safety contests and the advantages and disadvantages of this method of safety educational work were brought before the Committee. It was felt that more attention should be given to the causes of accidents and the means whereby they can be prevented from occurring. The Committee did not wish to be understood as opposing such contests when conducted under conditions that are agreeable to all concerned. It was pointed out, however, that some companies are now participating in several different contests, and that the burden of making additional reports would be objectionable. While the Committee took no definite action it was the consensus that safety contests on a national scale by member companies of the Edison Electric Institute should not be encouraged.

Mr. Rakestraw reported on traffic hazards and in the discussion of his report several points were raised that were of interest to power companies. One of these was the use of the governor in limiting speed of automobiles and trucks. Several were of the opinion that the use of governors for this purpose is likely to cause accidents as well as pre-

vent them and that serious consideration should be given before adopting this method generally to a fleet of vehicles operated by a power company. Those who have had occasion to use governors on their motor vehicles have found that they are not satisfactory in hilly country and in several instances accidents have been avoided by a narrow margin. It was thought by several that there are other and more effective means of meeting this problem than mechanical control, the most important being the proper selection and supervision of men.

The subject of highway lighting was given some consideration. The effects of proper lighting on highway and safe driving were mentioned and members of the committee were requested to look into this subject from the viewpoint of safety to motor driving and safety on highways in so far as power companies may be concerned.

Mr. Buchanan said that he had received a suggestion that Publication No. 110, "Tree Trimming Practices," be revised. He explained that this was a joint report of the Accident Prevention Committee and the Overhead Systems Committee of the former N.E.L.A. and was published in January of 1931. Several agreed with the suggestion that this report needed revising and following a discussion it was decided that this should be brought to the attention of other committees concerned, and if necessary an effort be made to undertake the revision as promptly as possible.

Arrangements are being made for a new issue of Resuscitation Charts, to be available in the near future. The new edition will be on heavier paper and consideration is being given to having them available with a varnished surface for use in locations where untreated paper deteriorates rapidly.

There was a discussion of the safe practice pamphlets that are issued under the sponsorship of the National Safety Council. One of these, designated as PU-3, entitled "Linemen's Rubber Protective Equipment," has been revised and plans were made for immediate review by members of this Committee who had not seen the revised draft.

Mr. Buchanan brought to the attention of the Committee Publication C12, entitled "Twelve Messages on Accident Prevention," which consists of a reprint of these articles as they appeared during the past year in the EDISON ELECTRIC INSTITUTE BULLETIN. It was pointed out that the first edition of this publication has been practically exhausted through advance orders and the Committee requested that another supply be printed immediately.

It was decided to hold the next meeting of the Committee at Detroit at the time some of the other Technical Committees meet during the last week of April or the first week of May.

Electrical Equipment Committee

W. F. Sims, Chairman

THE winter meeting of the Electrical Equipment Committee was held at the Hotel Statler, Buffalo, N. Y., February 10 and 11. In addition to about twenty-five members there were ten guests present at the meeting.

The morning session was a closed meeting where items of procedure and plans were reviewed. In addition the report on Apparatus Troubles was presented and discussed. Also, more recent failures of parts of electrical systems were reviewed in some detail by the members present.

A report form for reporting in detail on oil fires occurring on electrical systems was presented. This form is designed to obtain full and complete information on all important occurrences of this character so that experience data and information will be available for the revision of the present oil fire studies based upon the experience of member companies.

Under the sponsorship of the System Engineering Division a symposium on system reserve was presented. Individual papers describing the practice of the Commonwealth Edison Company, the Philadelphia Electric Company, the Public Service Electric and Gas Company and the Alabama Power Company were read by members from these respective companies. In addition several members described the individual practices of their systems. It was brought out that the reserve requirements of different types of systems were different and also that the necessary reserve in individual parts of systems differed, depending upon the nature of the load carried and the length of time probably required for the restoring of the section in case of failure. In connection with this discussion it was brought out that careful attention should be given to operating rules to see that the rules for operating in the case of emergency are in accordance with any new system setup.

The subcommittee preparing the report on Principles and Practices for Grounding reported that considerable progress has been made and that an approved draft of the report should be available for the consideration of the entire committee at the next meeting.

A report summarizing the experience and practice in foreign countries relating to the protection of water heaters was presented. In the discussion of this report it was brought out that most of the operating engineers felt that some form of backup protection should be included in a water heater installation to insure against possible damage in case of a failure of the control thermostat.

The Meter and Service Entrance Subcommittee presented a report on the experience in foreign countries relating to energy diversion.

This report also announced that new polyphase meters were available in both the A and S types in essentially the same size case and with the same general mounting arrangements as the present single-phase meters. These meters, developed primarily for application to network systems, are so arranged that in case of change from single-phase three-wire supply to network supply, the new meter can be mounted without substantial change in place of the old single-phase meter. The Handbook for Electrical Metermen was reported out of print. Steps are being taken to revise this book and prepare a new edition.

A report summarizing the results of the fusing practice of various companies for potential transformers, power transformers and station auxiliary transformers was presented and discussed. Fuses are used for all of these services by a number of companies. However, the report brought out that under certain conditions the fuses are omitted and dependence is placed in the line circuit breakers for opening the entire circuit in case of failure of the transformer.

A report summarizing the experience of members with the use of metal-clad switchgear was presented. This report brought out that although certain difficulties had been experienced with the use of this equipment in general its operation has proven to be satisfactory.

The Storage Battery Subcommittee presented a report describing a successful method followed in the rejuvenation of a large storage battery. The company reporting estimated that by the treatment of the battery two years' useful life had been added.

Prime Movers Committee Meeting

P. W. Thompson, Chairman

THE Prime Movers Committee met in Buffalo at the Hotel Statler on January 27 and 28. The meeting was well attended. Most of the business was concerned with receiving preliminary reports of the various subcommittees which are preparing reports. The highlights of the discussion are reported below.

Professor A. E. White read the ASME Condenser Tube Committee report made at the December, 1935, meeting of ASME. Copies have been distributed to members. Steel condenser tube sheets were reported on by several as giving good success to date.

Dean A. A. Potter reported on the work at Purdue University with their high pressure boiler. Their attention recently has been devoted to a study of the viscosity of steam and water in the ranges where data have not hitherto been available. They are now studying what reactions occur with different metals in contact with high pressure and high temperature steam. This work is being done under the guidance of an ASME committee. In brief, it is the plan to pass high temperature steam through short lengths of various materials held at a constant temperature for the entire length of the sample tested. Dean Potter would welcome any suggestions for materials to test.

Mr. Fellows reported that in a combination plain steel alloy steel superheater element the outlet end of which was made of 5 per cent chrome 0.1 per cent vanadium alloy material, the outlet end was found to be coated with black magnetic oxide. Tests showed that 0.014 lb. of iron per square foot had entered the reaction. Since then they have removed three elements and examined their entire length, with the finding that there is a variation in the amount of iron oxide formed. In the alloy part of the elements there is a greater amount of iron oxide formation, much to their surprise, than in the plain carbon portion. They find approximately 0.006 lb. per square foot represents the low value of the loss and 0.05 lb. per square foot represents the high value. The alloy tubing may have been subjected to higher temperature than the plain carbon tubing, which, if so, would account for a higher reaction rate, as the reaction rate increases rapidly with increasing temperature. It is not possible to define the comparative temperatures to which the various elements have been subjected.

Several members discussed the great non-uniformity of superheater tube temperature from element to element. Also the poor structural design of superheater elements was discussed.

There was discussion of and favorable sentiment for the organization of a committee responsible for collecting and issuing data on new plants. Mr. Krieg was appointed chairman.

After review and discussion it was agreed that it would be desirable for Turbine Subcommittee to collect data on the deposits in turbines with a view of arriving at causes and cures. A questionnaire has been drafted and will be referred to the subcommittee chairman, turbine manufacturers, and the Chemists Subcommittee for comments, and then used by the Turbine Subcommittee for the collection of data. A number of those present commented on experiences with comparatively thin deposits on turbine blades making marked reductions in capacity and efficiency.

Mr. Caldwell reported that the collection of data for the report is in progress. There have been two or three failures in water cooled bottoms of slag tap furnaces. He is endeavoring to get information on the economics of the disposition of heating surface between boiler surface, superheater surface, economizer surface and water wall surface.

Mr. Hopping related the Philadelphia Electric Company experience with hydraulic couplings and reported a tendency to hunt between about 2/3 and 3/4 speed. Steps are being taken to correct this and he considered them satisfactory.

Mr. Keeth mentioned experience with a hydraulic coupling which would not remain at the set speed. It used a reversible pump to handle the oil and was not provided with automatic regulation. No maintenance had been required, but some form of automatic control seemed necessary.

Mr. Thompson reported that the Detroit Edison Company has contracted for 48,000 cu. ft. per minute of blast furnace gas, which will be burned at the Delray plant over the stokers. He would appreciate information from anyone having had experience with the burning of blast furnace gas in similar services.

The committee was advised that there is a correction required to the Keenan steam tables in the high pressure and temperature range. The November issue of *Mechanical Engineering* gave the data for making this correction, the data being in CGS system units, and the March issue will repeat this information in British units.

Mr. Hopping reviewed briefly the experience with slag accumulating on the slag screen tubes of the Richmond pulverized fuel boilers. Two correctives were tried, one to create five lanes about 12 in. wide through the screen by the removal of both tubes of the double-row screen, the other to remove certain lower tubes only. The latter eliminated the slag bridging condition and simultaneously provided better screening of the boiler from radiant heat than the wide open lanes. They are increasing the operating pressure on their soot-blower lines to sweep a greater area with the soot blowers. They lost a water cooled slag bottom tube when the slag was drained almost to the bottom of the bed. There were evidences on other tubes of serious slag erosion of the water cooled bottom. The slag spout was raised to insure having a 5-in. slag layer at all times.

Professor White asked the guidance of the committee in his work on the ASTM committee which is attempting to write a specification for high temperature bolting materials. There is at present a difference of opinion in the ASTM committee, one group believing that the specifications should name definite compositions of materials and heat treatments, and the other group believing that the specifications should specify results to be obtained with whatever materials may be jointly settled on between the buyer and the seller. The former view might, in the present state of the art, tend to stifle development and thus be detrimental. The general consensus of opinion of the Prime Movers Committee was that a specification should be developed calling for physical properties and not excluding any particular materials, to which might be added an appendix stating the materials and heat treatments which will produce the specified physicals and give bolts satisfactory to the service.

The meeting was closed with a hearty vote of thanks to Mr. Cushing and his associates for their kindness in arranging for the meeting and inspection trips to Huntley Station and Niagara Falls.

Transmission and Distribution Committee Meeting

P. H. Chase, Chairman

THE ninth meeting of the Transmission and Distribution Committee of the E.E.I. was held at the Netherland Plaza Hotel in Cincinnati on February 13th and 14th. Thirty members of the committee were present or represented. About the same number of other power company engineers were present as guests.

Both sessions of the first day were given to a round table discussion of overhead distribution subjects under the sponsorship of Merrill DeMerit. Prepared discussions were presented on the following subjects:

Loading of Distribution Transformers.
Distribution Transformer Fusing Practice.
Grounding Transformer Cases.
Experience with Single Bushing Transformers.
Step Regulators on Feeder Circuits.
Preservative Treatment of Standing Poles.
Distribution Transformer Economic Design.
Taps on Distribution Transformers.
Wood Cross Arm Braces.

In addition to the prepared discussions on these subjects, several of them received extensive discussion from the floor.

The forenoon session on the second day was in charge of Mr. Seelye, Sponsor of Standards and Specifications Group. Mr. Smith reported on the work he had been doing in connection with pine pole treating specifications. The specification that had been prepared by one of the committees of the American Wood-Preservers' Association and which had been presented at a recent meeting of that association in Memphis, was discussed at considerable length. It was the consensus of those present that this specification could not be depended upon to give the quality of pine poles needed by the electric light and power industry. It was decided that the preparation of a specification that would be more satisfactory would be undertaken by this committee.

A preliminary draft of a proposed specification for low and medium voltage pin type insulators was presented by Mr. Knutz who explained that a departure had been made from the former practice of classifying pin type insulators by flash-over voltage. In its place, a numbering scheme was proposed which would result in an insulator being referred to by a class number and the desired characteristics for each class number insulator would be specified. Time did not permit a completion of the discussion of this report and it was decided that comments should be forwarded to Mr. Knutz as promptly as possible. From these comments he will prepare a revised draft and distribute to the committee membership so that this subject may be discussed at the next meeting.

Progress reports were submitted on the following subjects:

Weatherproof Wire Specifications—by W. G. Kelley.
Wood Cross Arm Specifications—by P. B. Stewart.
Pole Line Hardware Specifications—by E. V. Sayles.
Standardization of Distribution Fuses and Cutouts (submitted in writing)—by C. C. Cornelius.
Service Entrance Cable—by W. R. Bullard for A. E. Silver.

The afternoon session of the second day of the meeting was devoted to reports by Group Sponsors Eldredge, Davidson and Sinclair.

Mr. Eldredge told of plans under consideration by the Transmission Group for a series of papers each of which would compare types of construction that had been used for the various voltage classes of transmission lines. A comparison of the operating records for such lines was also under consideration. He read a report that had been prepared by D. M. Bunn which summarized the practice of several companies in the use of expulsion protective gaps on transmission lines and Mr. Hanssen described the work he has under way to obtain the operating records of transmission lines in various sections of the country.

Mr. Chase reported briefly for Dr. Davidson, Sponsor of the Plant Coordination Group. Mr. Haines reported on the status of the construction specifications for jointly-used wood pole lines which are expected to be completed for trial use in the near future. Mr. Haines also reported as a matter of information and interest to this group, the tree trimming practices followed jointly by the Edison Electric Illuminating Company of Boston and the New England Telephone and Telegraph Company.

Mr. Sinclair, Sponsor for the Underground Group, reported plans he has under consideration for a separate meeting of this Group where cable and underground problems will be discussed.

Mr. Nimmo, one of this committee's representatives on the Joint Committee that is preparing a report on grounding, reported that a draft of this report had been prepared, not including appendices, which has been distributed to the members of the Joint Committee for review. Comments received to date indicate that a revised draft can be prepared and distributed to the T. & D. Committee sometime in early March so that it should be possible to have a discussion of this report at the next meeting of this committee.

Advertising As an Aid

(Continued from page 48)

all are assets to the salesman when he goes out to call upon Mr. and Mrs. John Public.

The Salesman can profit by *using it.*

First he must be acquainted with the advertising . . . he ought to read each one . . . know what it says . . . be able to support his own statements by his company's statements.

That implies that he should get a copy of each printed advertisement available . . . particularly newspaper advertisements which are more complete in their statements.

Advance copies or proofs of newspaper advertisements are distributed by the Advertising Department in quantity to be brought to the attention of salesmen. Key men get them . . . these are read to group sales meetings by team captains.

These advertisements by your company are the institution's invitation to the public to interest themselves in our products . . . they are comparable to a personal invitation that might be sent from your home inviting some one to an evening's entertainment. . . . You would be chagrined should you open the door when guests arrive, if you did not know about the party that had been planned. . . . It is equally incumbent that you know what your company is saying in its published statements to the people, so that you may intelligently respond to inquiries that may be prompted by such published word.

POWER SALES ITEMS

AIR CONDITIONING

"Effective Temperatures as an Index of Air Conditioning Needed," by J. E. Hitlin, G. W. Hart. *Heating & Ventilating,* December, 1935, p. 43. The Industrial Press, Publishers, 148 Lafayette Street, New York City.

"Standards for Testing and Rating Air Conditioning Units Completed and Approved." *Heating & Ventilating,* December, 1935, p. 23. The Industrial Press, Publishers, 148 Lafayette Street, New York City.

Culminating work begun almost a year ago, the standards were approved by the Air Conditioning Manufacturers' Association, October 11, 1935.

"A Million Dollar Modernizing Job," by M. S. Lebair. *Heating & Ventilating,* December, 1935, p. 33. The Industrial Press, Publishers, 148 Lafayette Street, New York City.

The Department of Interior Building in Washington, recently air conditioned by the Government, contains over 8 million cubic feet of conditioned space. The installation was in operation within 150 days after the order was placed.

"Windowless Office Building." *Electric Refrigeration News,* January 8, 1936, p. 13. Business News Publishing Company, Publishers, 550 Maccabees Building, Detroit, Mich.

Description of Hershey office building, with data on the air-conditioning system installed.

CHROME PLATING

"New Chrome-Plating Process." *Electrical Foreign Trade Notes,* January 15, 1936, p. 7.

The process described, with notes on current consumption compared with present methods to which it is claimed to be markedly superior.

DIESEL ENGINES

"Paralleling with Utility Service." *Diesel Power,* December, 1935, p. 802. Diesel Publications, Inc., Publishers, 192 Lexington Avenue, New York City.

A small article with the idea that utilities should permit factory power plants to operate in parallel with their lines so that the isolated Diesel plant could then be designed for the average load.

"Midland, Michigan, Diesel Plant Reduces Water Pumping Costs," by Paul Stegeman, Superintendent. *Diesel Power,* January, 1936, p. 24. Diesel Publications, Inc., Publishers, 192 Lexington Avenue, New York City.

A description of the plant and the Diesel engine which will supply power, heat and carbon dioxide to its water system.

"Diesels Drill for Oil," by W. C. Lane. *Power,* December, 1935, p. 650. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

Diesel-electric and semi-Diesel-electric portable plants provide d c drilling rigs with power, anywhere, any time.

ELECTRIC DRIVE

"Printing Machine Drives." *Textile World,* January, 1936, pp. 86-87. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

Their characteristics and power application, with special reference to textile printing.

"Water Works Modernized Pumping Equipment." *Electrical Production,* January, 1936, p. 7. Electrical League of Cleveland, Inc., Publishers, Builders Exchange Building, Cleveland, Ohio.

Savings effected by replacement of steam-driven units by electric drive.

FLAW DETECTING

"X-Ray in Industry." General Electric Company *Bulletin No. 284,* 1933, 30 pp. General Electric Company, Publishers, 1 River Road, Schenectady, N. Y.

Uses and costs in detecting defects in castings and welds described, with many illustrations.

GAS PRODUCTION

"Air Reduction Company." *Fortune,* July, 1933, p. 24. Time, Inc., Publishers, 135 East 42nd Street, New York City.

Article traces production of oxygen, acetylene, and other gases with processes using much electricity, and the market for these gases.

INDUSTRIAL POWER

"Reducing Industrial Power Costs," by D. M. Myers. 1935, 378 pp. Price $4.00. McGraw-Hill Book Company, 330 West 42nd Street, New York City.

A simple, clear and convincing presentation of the money-saving possibilities of plants and their operation. Opportunities for rehabilitation, simple steam plant losses and savings, when to make and when to buy power are some of the matters discussed.

MINING

"West Virginia Coal Mining." *Coal Age,* January, 1936, pp. 3-6. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

Description of operations in Webster and Randolph counties, with notes on electric power supply.

OIL REFINING

"Electricity in Oil Refining." *The Oil and Gas Journal,* December 19, 1935, pp. 52-55. Petroleum Publishing Company, Inc., Publishers, 114 West Second Street, Tulsa, Okla.

The economics of purchased power discussed, with notes on new developments of significance to electric power companies.

POWER PLANTS

"Fuels for the Power Plant . . . Coal, Oil and Gas." *Power Plant Engineering,* January, 1936, p. 20. Technical Publishing Company, Publishers, 53 West Jackson Blvd., Chicago, Illinois.

"Automatic Control of Power Plants. Control Equipment Is the Nerve System of the Power Plant and Automatic Features Form the Brain That Makes the Modern Power System Practical." *Power Plant Engineering,* January, 1936, p. 33. Technical Publishing Company, Publishers, 53 West Jackson Blvd., Chicago, Illinois.

"The Power Plant of Yesterday and the Plant Today." *Power Plant Engineering,* January, 1936, p. 9. Technical Publishing Company, Publishers, 53 West Jackson Blvd., Chicago, Illinois.

POWER SALES

"Some Present-Day Problems of Industrial Power Sales," by George E. Whitwell. EDISON ELECTRIC INSTITUTE BULLETIN, December, 1935, p. 455.

PUMPS

"Automatic Control of Pumps," by Howard R. Green. *Instruments,* December, 1935, p. 318. The Instruments Publishing Company, Publishers, 330 West 42nd Street, New York City.

Methods of pump operation.

SUBSTATIONS

"Novel Factory Substation," by H. C. Bates. *Electrical World,* December 21, 1935, p. 3005. McGraw-Hill Publishing Company, Publishers, 330 West 42nd Street, New York City.

Combined indoor-outdoor arrangements saved money. Quick construction and low maintenance cost. Modern layout.

WASTE HEAT RECOVERY

"Waste Heat Recovery from Diesel and Gas Engines." *Southern Power Journal,* January, 1936, pp. 22-27. W. R. C. Smith Publishing Co., Publishers, 1020 Grant Building, Atlanta, Ga.

A review of waste heat recovery equipment and methods. The author includes some mathematics of "Heating Recovery" and some very useful general information on this subject.

WATER PUMPING

"Water Works Systems." *Siemens Zeitschrift,* December, 1935, pp. 541-549.

Modern electrical installations for pumping, filtering and distributing water.

WELDING

"Resistance Welds Widely Used," by George H. Hall. *Electrical World,* January 18, 1936, pp. 32-35 and 78. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

A description of the characteristics of various types of resistance welding, together with indications of the fields where the various methods are used. This article should be of interest to all power salesmen.

Current Problems in Rural Electrification

(Continued from page 51)

velopment, the use of electricity on the farm is limited to stationary operations such as household uses, feed grinding, water pumping, etc. It cannot successfully compete with the internal combustion engine and the animal motor in tractive operations such as plowing, hauling, etc. Furthermore, it is in these tractive operations where 65 to 75 per cent of the energy required on the farm is used. Therefore, electricity finds its greatest use on the farm in the home, for pumping water, which includes irrigation, and on the dairy, poultry, fruit and vegetable farms.

The information presented in Table VIII has been compiled from the 1930 agricultural census.

TABLE VIII

Total farms	6,288,648
General farms	1,044,266
Cash grain, cotton crop specialties	2,526,130
Fruit, truck, and dairy farms	830,816
Livestock farms (other than dairy)	550,042
Poultry farms	166,517
Other classifications	1,170,877

Looking at Table VIII, and remembering that electricity is not used on the farm for tractive operations, it will be seen that on more than 60 per cent of our farms, that is, general farms, cash grain, cotton crop specialties, and livestock farms, the primary use, and in many cases the only use, for electricity will be in the home. Furthermore, a look at Table V reveals that in those states where these types of farming predominate, the percentage of farms served is low.

It can then be said that a more general extension of electric service into rural districts reduces itself largely to a problem of improved living conditions. That this is needed and desirable no one acquainted with conditions can honestly deny. Furthermore, with cooking, refrigeration, water heating, lighting, water pumping, and miscellaneous uses, there is a minimum possible consumption of 4000 kwhr per year in every farm home. If this use could be attained we would experience a development of enormous proportions, and rates certainly would be reasonable because the fixed charges would be spread over many kilowatthours. Such a use would call for modernizing the farm home in many other ways in addition to electric service. It would mean furnaces, bathrooms and equipment, and running water. That much of this will come eventually I have no doubt, but it will take time and money.

It is not a case of selling the farmer on the desirability of electric service. Look at the figures in Table VI. In no year during the depression was there a decrease in the total number of farms using this service. Telephones were disconnected, automobiles stood in the garages, the old suit went another year, overalls were patched three layers deep, but electric service stayed.

In the last analysis the current Rural Electrification problem boils down to the farmer obtaining sufficient income to completely modernize his home. What is the solution? If you know any quick answer, I, for one, want to hear it.

References

Reports of Rural Lines Committee, National Electric Light Association, for years 1922 and 1923.

Reports of Rural Electric Service Committee, National Electric Light Association, for years: 1924, 1924-1925, 1925-1926, 1926-1927, 1927-1928, 1928-1929, 1930, and Report of Rural Electric Service Committee, National Electric Light Association, for 10-year period 1921-1931, issued in 1932.

C.R.E.A. News Letters, Numbers 1 to 12 inclusive.

C.R.E.A. Bulletins: Vol. I, Nos. 1, 2, 3, 4, 5, 6, 7. Vol. II, Nos. 1, 2, 3 ,4, 5, 6 7. Vol. III, Nos. 1, 2, 3. Vol. IV, No. 1. Vol. V, No. 1 Wiring the Farm for Light, Heat and Power. Vol. VI, No. 1 Report on Farm Electrification Research. Vol. VII, No. 1 Electricity on the Farm and in Rural Communities.

C.R.E.A. News Letters and Bulletins issued by Committee on the Relation of Electricity to Agriculture.

CONVENTIONS AND MEETINGS

FEBRUARY

1 Accident Prevention Committee, EEI offices, New York, N. Y.
3-6 National Electrical Manufacturers Association, Waldorf Astoria Hotel, New York, N. Y.
5-7 American Management Association, The Palmer House, Chicago, Ill.
10-11 Electrical Equipment Committee, Statler Hotel, Buffalo, N. Y.
13-14 Transmission and Distribution Committee, Netherlands Plaza Hotel, Cincinnati, Ohio.

MARCH

23-27 Third Annual Sales Conference and Sales Committee meetings, Edgewater Beach Hotel, Chicago, Ill.
23-24 National Power Sales Conference, Edgewater Beach Hotel, Chicago, Ill.

APRIL

23-25 Electrochemical Society, Cincinnati, Ohio.
27-30 Chamber of Commerce of the U.S.A., Washington, D. C.
29-30 Missouri Association of Public Utilities, St. Louis, Mo.

MAY

1 Missouri Association of Public Utilities, St. Louis, Mo.
11-14 National Fire Protection Association, Atlantic City, N. J.
25-28 National Electrical Manufacturers Association, Hot Springs, Va.

JUNE

17-20 The American Society of Mechanical Engineers, Dallas, Texas.
22-26 American Institute of Electrical Engineers, Pasadena, Cal.

SEPTEMBER

7-12 Third World Power Conference, Washington, D. C.

OCTOBER

26-30 American Gas Association, Atlantic City, N. J.

PRIZE AWARDS FOR 1936

Readers of the BULLETIN are reminded that entries for the H. M. Byllesby Prizes, the B. C. Forbes Prize, the A. L. Lindemann Prizes and the James H. McGraw Prizes must be forwarded to the Secretary of the Edison Electric Institute, 420 Lexington Avenue, not later than March 1, 1936, for consideration by the Prize Awards Committee.

Presentations of accomplishments for consideration for the Charles A. Coffin Award, the Augustus D. Curtis Award, the George A. Hughes Award and the Thomas W. Martin Award must be forwarded to the Secretary of the Institute not later than April 1, 1936.

Detailed information on the several awards for 1936 to be administered by the Prize Awards Committee of the Edison Electric Institute has appeared in the September, October and November issues of the EDISON ELECTRIC INSTITUTE BULLETIN.